

Sex Segregation in American Higher Education

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This chapter examines trends in sex segregation among fields of study for recipients of associate, bachelor's, master's, professional, and doctoral degrees between 1948 and 1980. Two indices of segregation are employed: the index of dissimilarity (Duncan's D) and the probability of intergroup contact (Lieberson's P^u). The former is viewed as an aggregate measure of segregation, whereas a version of the latter (the intragroup probability of contact) is viewed as an indicator of the extent of potential support networks. The analysis focuses on the timing and direction of change, as well as the extent of sex segregation at different levels of higher education. As expected, the data indicate that sex segregation by specialty declined among associate, bachelor's, and master's and professional degree recipients. Throughout the period examined, sex segregation was highest among associate degree recipients and lowest among doctoral degrees. Among the surprising findings are the stability of sex segregation among doctoral degree recipients and the asymmetry in the experience of change by men and women. Men at all levels of higher education were more likely to find women majoring in the same subjects, whereas women experienced a much smaller increase in contact with men. Explanations for these trends include the important effect of occupational segregation on educational choices, the influence of the women's movement and a variety of specific factors affecting each level of higher education differently.

pp. 191-214 in Laurie Larwood, Ann H. Stromberg and Barbara A. Gutek, eds., *Women and Work: An Annual Review*, Vol. 1, 1985. Beverly Hills, CA: Sage Press.

Higher education in America has undergone striking changes in the post-World War II period. Overall enrollments, the proportion of degrees granted in junior colleges, and the proportion of students enrolled in coeducational settings all have soared, transforming the college and university system.

The 1964 Civil Rights Act, the burgeoning Women's Movement, and the 1972 Title IX provisions of the Higher Education Acts all pointed to increased opportunities for women in higher education. By one measure of opportunity, enrollment, women have made dramatic strides in recent years. Women now receive more than one-half of all associate

AUTHOR'S NOTE: The comments of Paul Allison, Fred Block, Michelle Fine, Doug Massey, Sam Preston, and the editors of this volume are greatly appreciated.

degrees (two-year degrees typically granted by community colleges), one-half of all bachelor's degrees, one-third of doctoral degrees, and one-quarter of professional degrees. In 1950, women received only one-third of bachelor's degrees and less than one of ten doctoral and professional degrees. Female enrollments have grown at all levels of higher education.

Another indicator of opportunities is the fields of study women pursue. Men and women have always been concentrated in separate majors. Business, chemistry, and physics have traditionally been male bastions, while foreign languages, fine arts, and psychology have enrolled disproportionately high numbers of women. Although all specialties are formally open to men and women, informal social processes work to channel men and women into separate specializations (Hearn & Olzak, 1981). The educational arena is a particularly interesting setting in which to study patterns of segregation by sex because of the substantial role of informal social controls in maintaining a highly stable structure of segregation.

Table 7.1 presents data collected by the National Center for Educational Statistics on the size and sex composition of fields of study for bachelor's, master's, professional, and Ph.D. degree recipients. Bachelor's degree fields range in sex composition from home economics and library science, which graduated over 95 percent women in 1980, to engineering and military science, which graduated 9.3 and 3.9 percent women, respectively. At the master's and professional degree level, women comprise over 70 percent of teachers but only 13 percent of dentists. Ph.D. programs enroll fewer women, but there is still a great range in concentration: 57.4 percent of foreign language Ph.D.s are women compared to 14.4 in the physical sciences.

This chapter will focus on trends in the specializations pursued by women and men throughout higher education. How have the changes in higher education since the 1940s affected the fields men and women pursue? This question parallels in the educational area a line of studies that has examined changes in occupational segregation by sex in the U.S. labor force (England, 1981; Beller, 1984a; Jacobs, 1983). This research has documented the remarkable resilience of sex segregation over the course of the century. This chapter will investigate whether the educational realm is as resistant to change as the occupational structure.

In addition to the central focus on change over time, this chapter will ask a number of subsidiary questions. First, how do different levels of higher education compare in the level of sex segregation they exhibit? Second, how have men and women experienced these changes? That is, have men and women experienced a great increase in the probability of sharing academic specializations with members of the opposite sex? In

TABLE 7.1
Degrees Received in 1980 by Field of Study for
Bachelor's, Master's, and Ph.D. Degrees

	<i>Bachelors</i>		<i>Masters</i>		<i>Ph.D.</i>	
	<i>n</i>	<i>%f</i>	<i>n</i>	<i>%f</i>	<i>n</i>	<i>%f</i>
Agriculture	22,802	29.6	3,976	22.5	991	11.3
Architecture	9,132	27.8	3,139	28.4	79	16.5
Biology	46,370	42.1	6,510	37.1	3,636	26.0
Business	186,683	33.6	55,148	22.3	796	14.4
Education	118,102	73.8	103,453	70.2	7,940	44.3
Engineering	68,893	9.3	16,243	7.0	2,507	3.8
Fine Arts	40,892	63.2	8,708	53.3	655	36.9
Foreign Languages	11,133	75.5	2,236	70.2	549	57.4
Health Professions	63,920	82.2	18,982	62.7	786	44.7
Home Economics	18,411	95.3	2,690	91.3	192	76.0
Law	683	45.5	37,464	29.6	40	10.0
Letters	69,249	56.4	11,591	57.8	2,068	40.6
Library Science	398	95.0	5,374	81.3	73	52.1
Mathematics	11,378	42.3	2,860	36.1	724	13.8
Military Science	251	3.9	46	0.0		
Physical Sciences	23,410	23.7	5,219	18.6	3,089	12.4
Psychology	41,962	63.3	7,806	56.8	2,768	42.1
Social Sciences	143,914	46.9	33,040	46.0	3,762	28.2
Theology	6,207	25.5	11,037	19.9	1,319	5.8
Interdisciplinary	45,627	45.3	8,599	33.2	641	22.6
Dentistry			5,258	13.3		
Medicine			14,902	23.4		
Optometry			1,085	15.7		
Osteopathy			1,011	15.7		
Podiatry			580	12.6		
Veterinary Medicine			1,235	32.8		

SOURCE: The National Center for Educational Statistics (1948-1980).

answering this question the multifaceted nature of segregation will be examined. Third, what accounts for the patterns of change that are found?

The field of study students pursue is an important aspect of their experience of higher education. A substantial proportion of undergraduate course work is directed to fulfilling requirements for the student's major; this has been true throughout the postwar period (Dressell & Delisle, 1969). The college major or professional specialization affects subsequent occupational and earnings possibilities as well as a range of experiences during matriculation (Angle & Wissman, 1981; Jacobs, in press). Consequently, a number of studies have focused on the differences in fields pursued by men and women in higher

education (Beller, 1984b; Lyson, 1981; Thomas, 1980; Lloyd & Niemi, 1979; Polachek, 1978). The present investigation broadens these efforts by considering a broader sweep of time; by comparing trends in sex segregation at different levels of higher education; and by using two complementary indicators of segregation.

DATA AND METHODS

The National Center for Educational Statistics publishes statistics on degrees received annually. These statistics are published in a series, *Earned Degrees Conferred in Higher Education*, and are also reprinted in the annual *Digest of Educational Statistics*. The data series is continuous from 1948 to 1980, the most recently published year. Associate degree data dates from 1966. The data is based on complete or virtually complete reports from all colleges and universities throughout the United States.

Two measures of segregation are employed. The standard measure of segregation, Duncan's index of dissimilarity (D), is supplemented with Lieberman's P*. D is interpreted as measuring the proportion of men or women who would have to change majors in order to produce an even distribution in all specialties (Duncan & Duncan, 1955). P* measures the probability of intergroup contact. In recent research on residential segregation, this statistic has been employed to provide new insights into the structure of segregation (Lieberman & Carter, 1982; Massey & Mullan, 1984). P* has two important properties that should be recognized: It depends on the relative size of different groups and it is asymmetric, that is, the probability of men's contact with women will differ from women's probability of contact with men. For example, if men comprise 80 percent of a group, and men and women are moderately segregated, men may have a 15 percent chance of contact with women in a given encounter, while women may have a 60 percent chance of contact with men. In the case of the analysis of two groups, the probability of intragroup contact and intergroup contact sum to 1. Consequently, in the above example, if men's possibility of contact with women is .15, their probability of contact with men is .85.

This statistic supplements the overall index of segregation by revealing the way a social situation is experienced by each group. Two different settings with equal levels of segregation (D) but different proportions of women will have different probabilities of contact, a feature of segregation revealed by P*. In the educational setting, the probability of intragroup contact may be viewed as providing the potential context for peer support networks. The degree to which women have other women for academic support may be important to

their chances for academic success (Alexander & Thoits, 1983). Likewise, the frequency of men's contact with women in academic settings may be an important factor influencing their views of women's capabilities (Kanter, 1977). The P* statistic taps this important dimension of segregation in a way that the index of dissimilarity does not.

Segregation is a double-edged sword. High segregation has the positive effect of increasing intragroup contact. This facilitates communication among group members and enhances the opportunities for networking, sharing information, and political mobilization. Yet segregation has negative consequences as well. Segregation results in the restriction of access to desirable opportunities. The utilization of two separate indices helps to shed light on these different aspects of segregation.

It should be noted that the P* statistics presented here refer to contact between men and women in classes, not in other settings. More specifically, the figures measure the likelihood of sharing the same major for men and women. One must also note that these figures represent national averages. The sex composition in a given school may differ substantially from these national averages, with single-sex colleges being the extreme case. In that instance, the statistic refers to the likelihood that a random individual specializing in one's field of study is a man or a woman, not the direct probability of contact with a classmate at one's college or university.

COMPARABLE MEASURES OVER TIME

A central methodological issue is the selection of appropriate categories across which segregation can be measured. All indices of segregation are sensitive to the categories employed. The number of educational specialties reported in the NCES data often changes. For example, in 1948 there were 67 specialties for bachelors degree recipients; in 1980 over 300 categories were listed. This poses a problem for analysis of trends over time because one cannot tell how much change is due to the reclassification of specialties. The approach to handling this problem here was the use of major categories as the units of analysis. For bachelor's, master's, and doctoral degree programs, 20 categories were essentially constant throughout the period considered. These categories, along with the professional categories employed, are listed in Table 7.1.

Two potential problems with relying on major categories were considered. The first is that the degree of segregation may be severely underestimated as a result of using these major categories. Within broad

specialties, women and men are not evenly distributed. Consequently, the higher the level of aggregation, the smaller the proportion of actual segregation captured by one's measure. The second problem is that gross units of analysis may misrepresent trends over time. The major categories may capture an increasingly small proportion of overall segregation as specializations proliferate. England has emphasized this point in studies of trends in occupational segregation by sex (1981). The reliance on standardized categories may be deceptive, in that the underlying phenomenon may become increasingly remote from the measures employed.

Given these potential difficulties, it is important to examine whether major fields constitute an appropriate unit of analysis. Table 7.2 presents indices of segregation (*D*) for the major categories and for the most detailed available categories for 1952, 1960, 1970, and 1980 for bachelor's, master's, and doctoral degrees.¹ Three striking results in Table 7.2 are quite reassuring. The major categories consistently capture between 80 and 90 percent of the index of dissimilarity revealed by the detailed categories. The number of categories generally has even smaller effects on *P**.

Second, the major categories appear as robust in 1980 as in 1952. There is no apparent secular decline in the proportion of segregation captured by the major categories. In spite of increasing specialization, the major categories employed here are reliable indicators both of the level and of the trend in specialization of educational majors. Third, major categories capture comparable proportions of total segregation for each level of higher education examined. Thus comparisons between bachelor's, master's, and doctoral degrees will not be biased as a result of the reliance on major categories.

In addition to paving the way for the subsequent analysis, these results offer a provocative substantive interpretation: students chose major fields first and then detailed specializations within these fields. That may be why the dramatic proliferation of specializations within certain fields has not increased the overall level of segregation. Sex-role socialization channels men and women into different majors; specialization within these fields is a subsequent process with a constant incremental effect on overall sex segregation. Table 7.2 thus not only provides a convenient empirical finding but is also suggestive of the process by which specialties become segregated by sex.

A final issue regarding categories is the problematic nature of professional degrees. Before 1961, professional degrees such as law, medicine, and theology were grouped with bachelor's degree statistics. Professional degree recipients were removed in calculating segregation statistics for bachelor's degrees during this period.²

TABLE 7.2
Comparison of Indices of Segregation for Major and Detailed
Categories for Bachelor's, Master's, and Ph.D. Degrees

Year	Date	<i>D</i>	<i>P*WW</i>	<i>P*WM</i>	<i>P*MM</i>	<i>P*MW</i>	Major <i>D</i> / Detailed <i>D</i>
Bachelor's Degrees							
Major	1952	46.6	.49	.51	.75	.25	85.1
Detailed		53.6	.49	.51	.76	.24	
Major	1960	51.4	.56	.44	.76	.24	81.7
Detailed		62.9	.67	.33	.82	.18	
Major	1970	47.1	.60	.40	.70	.30	86.4
Detailed		54.5	.66	.34	.74	.26	
Major	1980	35.2	.52	.48	.60	.40	84.8
Detailed		41.5	.62	.38	.63	.37	
Master's Degrees							
Major	1952	31.5	.40	.60	.73	.27	79.1
Detailed		39.8	.44	.56	.74	.26	
Major	1960	39.5	.43	.57	.74	.26	88.2
Detailed		44.8	.51	.49	.77	.23	
Major	1970	40.2	.47	.53	.69	.31	81.7
Detailed		49.2	.41	.59	.73	.27	
Major	1980	41.3	.40	.60	.61	.39	87.3
Detailed		47.3	.36	.64	.65	.35	
Ph.D. Degrees							
Major	1952	32.1	.14	.86	.91	.09	86.8
Detailed		37.0	.16	.84	.91	.09	
Major	1960	34.7	.18	.82	.90	.10	81.2
Detailed		39.5	.21	.79	.91	.09	
Major	1970	32.4	.20	.80	.88	.12	87.8
Detailed		39.9	.23	.77	.88	.12	
Major	1980	32.2	.38	.62	.74	.26	88.5
Detailed		36.4	.40	.60	.75	.25	

SOURCE: The National Center for Education Statistics (1948-1980).

After 1961, data on professional degrees are published separately. The problem is that the distinction between masters' and professional degrees in published statistics is an arbitrary one. The professional degrees in the NCES data are all male-dominated fields, including medical specialties, law, and theology. Masters in business administration, as well as degrees in such female-dominated professions as education and social work, are classified as masters' degrees, not as professional degrees. This distinction, which I feel is artificial, results in

TABLE 7.3
Bachelor's Degree Segregation, 1948-1980

Year	Percentage Female	D	P*WW	P*WM	P*MM	P*MW
1948	24.0	45.2	.47	.53	.84	.16
1952	33.8	46.6	.51	.49	.75	.25
1956	38.3	52.7	.58	.42	.74	.26
1960	37.5	53.7	.55	.45	.75	.25
1964	42.9	52.7	.62	.38	.72	.28
1968	43.4	48.5	.60	.40	.70	.30
1972	43.6	45.7	.59	.41	.68	.32
1976	45.5	39.7	.57	.43	.64	.36
1980	49.0	35.2	.58	.42	.60	.40

SOURCE: The National Center for Education Statistics (1948-1980).

peculiar indices of segregation, particularly for professional degrees. The appropriate grouping for measures of segregation is a combination of master's and professional degrees.

RESULTS

The results section will be divided into two parts. A description of the patterns of change for each level of higher education will be presented, followed by a comparison of these trends.

Bachelor's Degrees

Table 7.3 presents data on bachelor's degrees from 1948 to 1980. In this and subsequent tables, the year, the percentage female, the index of segregation (D), and the probabilities of intra- and intergroup contact are presented. There are four different probabilities of contact, with P*WW indicating the probability of contact with women for women; P*WM, the probability of contact with men for women; P*MM, the probability of contact with men for men; and P*MW, the probability of contact with women for men. These figures represent national averages. They can be interpreted as indicating the probability that a random comajor is a man or a woman. Indices were calculated for each year; every fourth year is presented in the tables.

For bachelor's degrees, the index of segregation rose from 45 to 54 between 1948 and 1961, and then declined slowly and steadily from 1961 to 1980. The 1980 level of segregation was 35.2, indicating that over 35 percent of women would have had to change majors to be distributed in the same manner as men. To give an indication of how this figure

compares to others, the degree of occupational segregation by sex in 1981 in the U.S. labor force was over 60; the degree of occupational segregation between white and black men in 1981 was just over 35. Thus the degree of segregation between men and women in bachelor's degree programs was quite similar to that of the racial segregation of occupations but was much lower than the sex segregation of occupations.

The probability of intragroup contact for women (P*WW) increased from 47 in 1948 to 58 in 1980. This figure indicates that women bachelor's degree recipients on the whole have not found themselves an isolated minority. As a result of substantial enrollments and significant segregation, women bachelor's degree candidates on the average have had approximately an equal chance of having men and women classmates for much of the postwar period. Men, on the other hand, have historically been much less likely to come into contact with women as comajors. The probability of contact with women for men (P*MW) has grown from .16 in 1948 to .40 in 1980. This asymmetry reflects the fact that men have until recently exceeded women in enrollment and have been segregated from women in the majors they pursue. The probability figures in Table 7.3 exemplify the asymmetric nature of intergroup contact: Women, a sizable minority group in this case, have had roughly equal chances of having men and women as classmates, whereas men, the majority, were much less likely to encounter women in classes.

The trends in intergroup contact reflect trends in enrollments and segregation. Between 1948 and 1970, both men and women experienced increased chances of having women as classmates, as the increases in women's enrollments exerted the dominant influence on P*s. After 1970, however, women's chances of having women as classmates stabilized and then declined slightly, whereas men's probability of having women classmates increased sharply. In the 1970s women's enrollments continued to increase, but the decline in segregation between the sexes had the dominant effect. As women moved into more male-dominated fields, their probability of encountering male classmates increased and their probability of encountering female classmates declined.

Master's and Professional Degrees

As Table 7.4 indicates, master's and professional degree sex segregation has largely followed the pattern found for bachelor's degrees. From 1948 to 1960, the level of segregation in master's and professional degrees rose from the low 40s until the low 50s. The index of segregation fell below 50 in 1965, and continued to fall slowly through 1980, when it

TABLE 7.4
Professional and Master's Degree Segregation,
1948-1980

Year	Percentage Female	D	P*WW	P*WM	P*MM	P*MW
1948	23.3	48.0	.41	.59	.82	.18
1952	22.2	47.7	.38	.62	.82	.18
1956	24.8	52.4	.43	.57	.81	.19
1960	24.1	52.5	.42	.58	.81	.19
1964	26.0	50.3	.43	.57	.80	.20
1968	30.7	47.8	.48	.52	.77	.23
1972	35.5	49.5	.53	.47	.74	.26
1976	41.2	45.9	.55	.45	.69	.31
1980	44.7	42.9	.56	.44	.65	.35

SOURCE: The National Center for Education Statistics (1948-1980).

TABLE 7.5
Ph.D. Degree Segregation, 1948-1980

Year	Percentage Female	D	P*WW	P*WM	P*MM	P*MW
1948	12.0	34.3	.20	.80	.89	.11
1952	9.3	32.1	.14	.86	.91	.09
1956	9.9	30.2	.16	.84	.91	.09
1960	10.5	34.7	.18	.82	.90	.10
1964	10.6	34.8	.17	.83	.90	.10
1968	12.6	34.0	.19	.81	.88	.12
1970	13.3	32.4	.20	.80	.88	.12
1972	15.8	31.4	.22	.78	.85	.15
1976	22.8	30.5	.30	.70	.79	.21
1980	29.7	32.2	.38	.62	.73	.27

SOURCE: The National Center for Education Statistics (1948-1980).

reached 42.9. This level was higher than that of bachelor's degrees, with the gap widening during the 1970s.

The probability of intergroup contact reveals similarities with the bachelor's degree pattern. Trends in intragroup contact for female master's and professional degrees rose from just over 40 in 1948 to 56 in 1980. Men's probability of contact with women rose from .18 to .35 over this period.

Doctoral Degrees

Doctoral degrees exhibited remarkable stability in sex segregation over the period examined, as indicated in Table 7.5. The index of segregation hovered in the low 30s throughout the postwar period. In 1948, the index of dissimilarity was 34.3; in 1980 it remained at 32.2. At

no time did it rise above 37 or fall below 30, with most changes apparently reflecting annual variations rather than a secular trend. Although degrees received by women have risen from under 10 percent to over 30 percent of all Ph.D.s awarded in 1980, the degree to which men and women have remained segregated stayed quite constant throughout this period.

The probability of intergroup contact reveals an interesting pattern of isolation of female doctoral candidates. Female doctoral candidates have had relatively low chances of having female classmates until very recently, when women's enrollments skyrocketed. Females' probability of having a random classmate be female tended to be about 20 percent until 1972, when it began to steadily increase toward 40 percent. Male doctoral candidates have had little contact with their female counterparts, with the probability of a classmate being female at or below 10 percent until nearly 1970.

Associate Degrees

Data on associate degrees covering the period 1966 to 1980 are presented on Table 7.6. NCES data classify associate degrees into 75 categories that have been quite stable since 1971. The figures presented in Table 7.6 for prior years are estimated levels of segregation, assuming the same categorization of fields of study employed in subsequent years.³ The level of segregation by sex was highest for associate degrees.⁴ The lowest figure for 1980 was substantially higher than the highest year for any other level of higher education. At the peak level of segregation, in the early 1970s, nearly 75 percent of men or women would have had to change fields in order to be equally distributed. After a decade of sharp declines, the index of segregation remained above 60 in 1980.

Associate degrees have had the highest representation of women of any level of higher education. Women had become a majority of degree recipients by 1980. Given the high representation of women and the high degree of segregation, it is not surprising that women associate degree candidates have had high probabilities of intragroup contact. During the 1970s the probability of intragroup contact stabilized and then declined, as the effect of decreasing segregation outweighed the effect of increasing proportions of female enrollment. Throughout this period women had nearly an 80 percent chance of having a random classmate be female. Male associate degree candidates experienced a sharp increase in contact with their female counterparts due to the combination of increased enrollment of women and declining segregation. Men's chances of encountering a female classmate increased from 18 percent to 30 percent.

TABLE 7.6
Associate Degree Segregation, 1966-1980

Year	Percentage Female	D	P*WW	P*WM	P*MM	P*MW
1966	45.0	71.8	.80	.20	.82	.18
1967	46.7	64.6	.79	.21	.81	.19
1968	47.2	76.8	.82	.18	.83	.17
1969	46.9	76.0	.82	.18	.83	.17
1970	47.1	76.2	.81	.19	.83	.17
1971	45.7	74.2	.80	.20	.84	.16
1972	46.6	73.9	.80	.20	.83	.17
1973	47.2	70.0	.77	.23	.80	.20
1974	48.3	69.5	.77	.23	.79	.21
1975	49.7	71.5	.79	.21	.80	.20
1976	48.8	68.7	.77	.23	.79	.21
1977	49.7	66.5	.77	.23	.77	.23
1978	51.5	65.3	.76	.24	.75	.25
1979	53.3	62.5	.76	.24	.73	.27
1980	55.1	59.8	.76	.24	.70	.30

SOURCE: The National Center for Education Statistics (1948-1980).

Comparison of Trends

Graphic depictions of trends in segregation in higher education by level of degree are presented in Figures 7.1, 7.2, and 7.3. Figure 7.1 presents trends in D, the index of dissimilarity for degrees garnered at each level of higher education. Figure 7.2 presents trends in intragroup contact probabilities for women for all degree levels. Figure 7.3 presents trends in intragroup contact probabilities for men.

Bachelor's and combined master's and professional degree indices of segregation (as shown in Figure 7.1) increased in the 1950s and declined subsequently. Master's and professional degree segregation was slightly higher than bachelor's degree segregation, and the gap widened during the 1970s. Associate degree segregation declined after increases in the late 1960s. Indices of segregation at the doctoral level, the lowest of the group, were also the most stable, with no downward trend.

The probabilities of intragroup contact for women, shown in Figure 7.2, rose for master's, professional, and doctoral degrees as female enrollment increased. P*WW stabilized and declined for bachelor's and associate degrees during the 1970s, as the declines in segregation counterbalanced the increase in female enrollments.

The probabilities of intragroup contact for men, shown in Figure 7.3, declined dramatically at all levels of higher education. Increased enrollment of women and declining or stable segregation produced

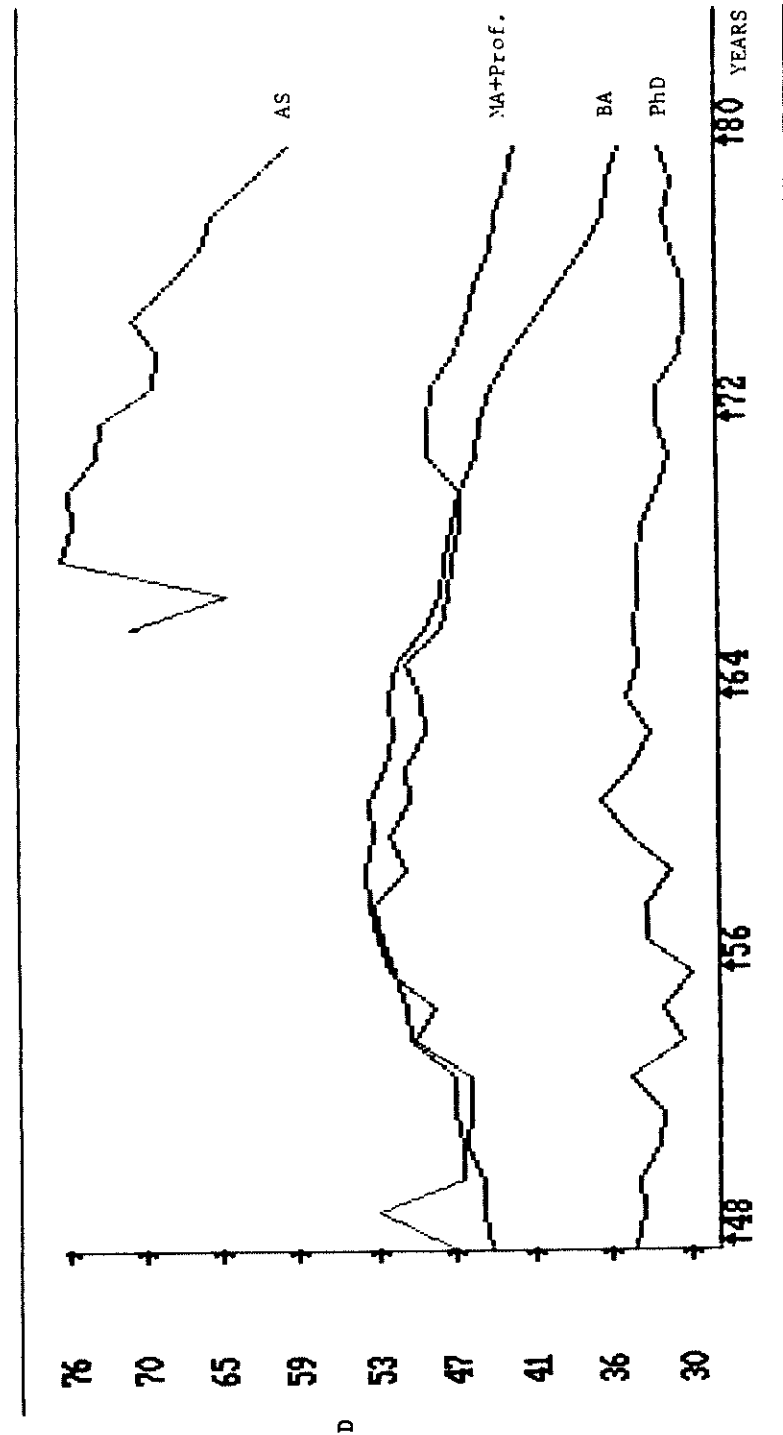


Figure 7.1: Trends in Index of Segregation (D), 1948-1980

sharp reductions in men's contact with other men. At all levels of higher education, however, men have been more likely to encounter each other than to encounter women. The comparison of Figures 7.2 and 7.3 clearly demonstrates the asymmetric effects of the change on men and women.

With the exception of master's, professional, and bachelor's degrees, the relative position of the different degrees has remained constant over time. Associate degrees by far have had the highest degree of segregation by sex; Ph.D. degrees have consistently had the lowest level of segregation. For most of the period examined, bachelor's, master's, and professional degrees have had very similar levels of segregation. In the 1970s, sex segregation among bachelor's degree recipients declined precipitously, leaving master's and professional degrees with the higher level of segregation.

DISCUSSION

Explanations for the two salient features of these patterns will now be considered: First, the relative degree of sex segregation evident at different levels of higher education; and second, the different patterns of change.

What factors account for the high degree of sex segregation among associate degrees, the low level found among Ph.D. recipients, and the faster decline among bachelor's degree recipients than among master's and professional degree recipients? One factor may be the relationship of educational programs to subsequent occupational opportunities. Students pursue educational programs in part to further career objectives. Educational and career choices are often studied together and seen as part of a unified process (Astin, 1977; Davis, 1965).

The selection of educational specialties reflects occupational segregation prevalent at the time students make their educational choices. Students make choices to pursue educational areas that they can reasonably expect will lead to a job and perhaps a career upon graduation. Among the considerations involved in a realistic choice is the current sex composition of an occupation. If women are exceptions in an occupation at present, choosing a field of study leading to that occupation is somewhat less realistic than it would otherwise be.

This process helps to explain the relative degree of sex segregation at different levels of higher education because the educational level of workers varies directly with occupational segregation by sex. The professions, which include workers with bachelor's, master's, and doctoral degrees as well as professional degrees, are less segregated by sex than are other occupations. Further analysis of occupational

segregation by sex links this differentiation directly to educational level. Men and women with more than 17 years of education are less segregated by occupation than bachelor's degree recipients and those with fewer than 16 years of education (Jacobs, 1983). Women with these educational credentials are still underrepresented in the labor force, but among men and women at the highest levels of educational attainment, sex segregation is less prevalent.

The pattern of sex segregation in higher education, therefore, in part mirrors occupational differentiation by sex. Workers in professional occupations are less segregated by sex, and the educational system that tracks such workers into careers reflect this fact. The high degree of sex segregation in associate degree programs may be due to the relatively high levels of sex segregation found in the occupations that associate degree graduates can expect to enter.

I am suggesting a reciprocal relationship between educational and occupational segregation. The sex segregation found in the educational system to some extent helps to perpetuate occupational segregation (Polachek, 1978). But the reverse direction of causality is being emphasized here because it is rarely considered. The patterns of educational segregation by sex in part reflect the contours of sex segregation in the labor market.

It is also interesting to note that historical trends in occupational sex segregation broadly parallel the patterns found here. Occupational segregation by sex rose in the 1950s and declined subsequently, as did sex segregation in higher education. The same connection might explain the stability of segregation at the Ph.D. level. The academy has been slow to admit women, in part due to the restricted opportunities in American universities in the 1970s. Thus the stability of sex segregation in academic specialties may be a factor in the continued sex segregation of Ph.D. candidates. Thus the cross-sectional and temporal dimensions of sex segregation in higher education match those of occupational segregation by sex.

Another possible explanation of this pattern is that sex segregation is reduced when the time for choice is extended. Associate degree candidates typically have to choose their specialties before entering. The opportunities to change specialization after socialization in a college setting are minimal. Students bring with them stereotypical notions of appropriate choices for young men and women, and these attitudes directly translate into choices of educational specialties.

At higher levels of the educational system, choices are delayed, and students are subjected to a greater diversity of students and ideas before they are required to choose majors. There is some evidence to suggest that the socialization afforded by college reduces the sex segregation of

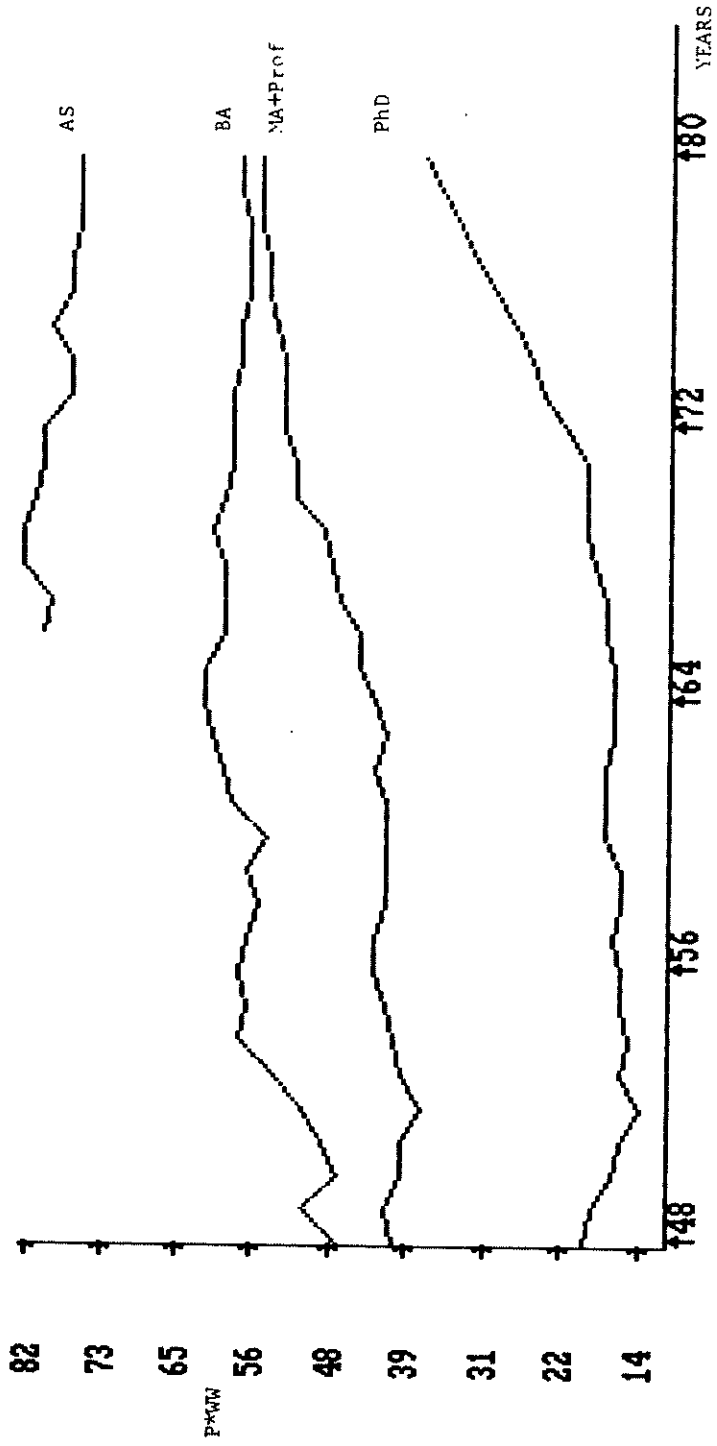


Figure 7.2: Trends in Probation of Intragroup Contact for Women, 1948-1980

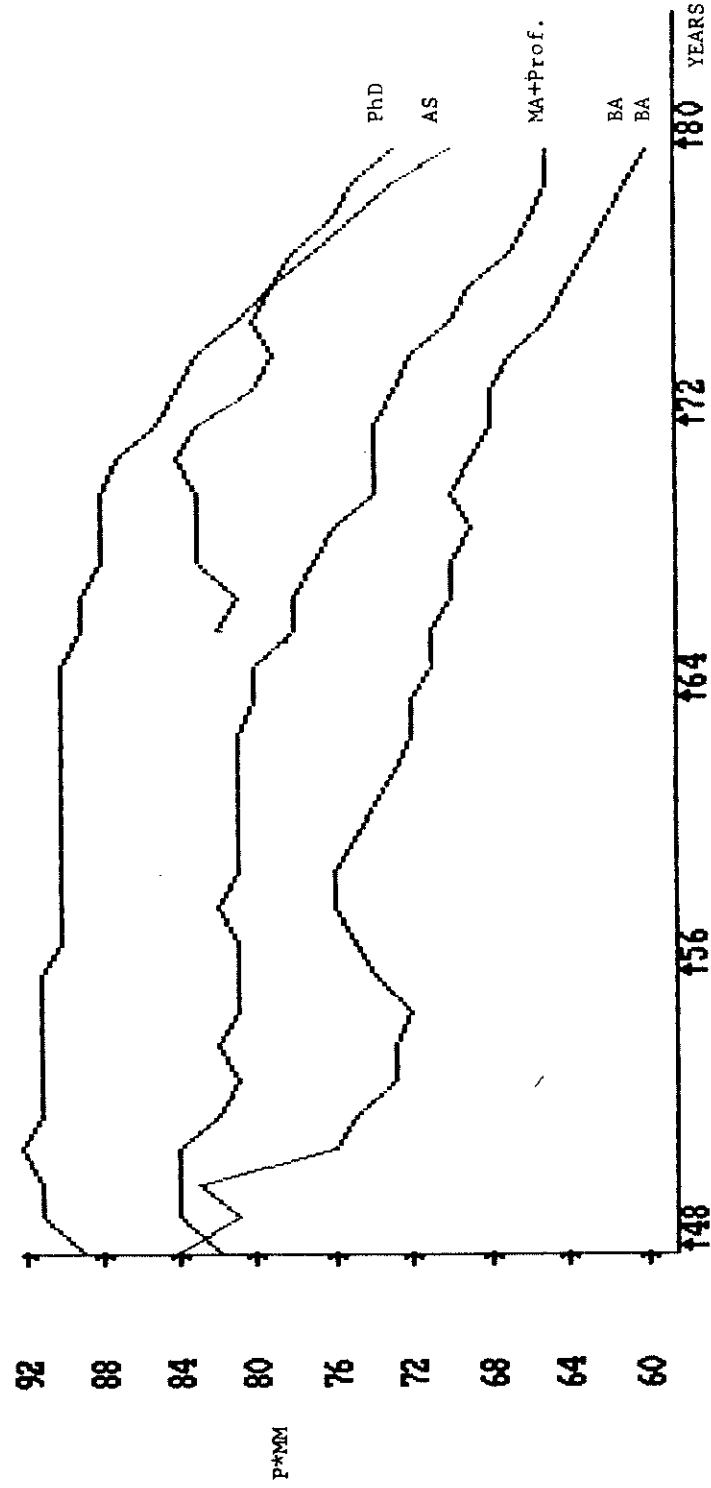


Figure 7.3: Trends in Probabilities of Intragroup Contact for Men, 1948-1980

majors. Longitudinal analysis of choices of majors by bachelor's degree candidates reveals that the degree of sex segregation declines between freshman year and senior year (Jacobs, 1985; Bressler & Wendell, 1980). Master's, professional, and Ph.D. degree candidates had four years of college to mull over the choice of specialty in pursuing further education. I am suggesting that the socialization afforded by the college environment serves to reduce the sex segregation of choices, at least during periods of changes in sex-role attitudes. The more exposure to this environment, the less differentiated choices become.

These suggestions point to lower levels of sex segregation at higher levels of the educational system. But why do master's and professional degrees exceed bachelor's degrees in the level of sex segregation in recent years? The explanations so far discussed would point in the opposite direction. To answer this question we need to consider trends over time. The explanation will have to do with factors that speeded the decline in sex segregation at the bachelor's degree level but slowed it at the master's and professional degree levels.

The decline in sex segregation described here began during the 1960s, as the Women's Movement started to emerge as a significant force in American life. The call for greater opportunities for women in higher education was among the leading issues of the Women's Movement from the earliest days of the current revival of feminism. Betty Friedan's *Feminine Mystique*, often cited as marking the beginning of the new wave of feminist activism, emphasized the exclusion of women from professional education. Friedan (1963, p. 152) wrote critically of "feminine" higher education, which defines sociology, anthropology, and psychology as acceptable for women but excludes "pure science (since abstract theory and quantitative thinking are unfeminine)." The higher education of women has consistently been a focal concern of the Women's Movement.

The Women's Movement also directly affected the sex segregation of American higher education by pressuring institutions of higher education to change their recruitment and admissions procedures. The increased attendance of women in professional and master's degree recipients, was in no small measure the result of pressure to eliminate enrollment quotas and other practices restricting admission for women (Rossi & Calderwood, 1973; Westervelt, 1975). This pressure culminated in the 1972 Title IX Amendments to the Higher Education Act, which proscribed sex discrimination in higher education. Subsequent programs, developed at all levels of higher education including the associate degree level, have been introduced to attempt to reduce inequities related to sex.

Associate degree sex segregation was so high that significant political pressure resulted in a sharp decline, although sex segregation remains at high levels. The 1976 Title II provisions specified a number of measures to provide sex equity in vocationally oriented programs. It is not unreasonable to infer that these measures may well have contributed to the decline in sex segregation among associate degree recipients.

Two factors are particularly important in the rapid decline in sex segregation among bachelor's degree recipients. First, the rapid growth of coeducation in the 1960s and 1970s may have contributed to a decline in sex segregation in the choice of majors. Between 1960 and 1980, the proportion of colleges and universities with coeducational enrollments rose from 76 percent in 1960 to 92 percent in 1980 (data from National Center for Educational Statistics, 1960-1980). Coeducational settings may facilitate a decline in sex segregation by giving students access to a wider range of courses and curricula and by enabling students to mimic the choices of students of the opposite sex.

A second important factor at the bachelor's degree level was the rapid decline in enrollment of women in teaching. In 1959 over 47 percent of women bachelor's degree recipients received their degrees in teaching; by 1980 the proportion had declined to 19 percent. This single female-dominated specialty included such a large proportion of women that its contraction single-handedly produced a large decline in sex segregation at the bachelor's level. These two factors combined to produce the largest decline in sex segregation at the bachelor's degree level, over and above the secular decline found throughout higher education.

One might have expected a steeper decline in sex segregation among master's and professional degree recipients as a result of the dramatic rise in enrollments of women in professional programs previously overwhelmingly attended by men. The reason for a more modest decline has to do with the paradoxical effects of the growth of extreme cases on measures of segregation.

If all else remains equal, the growth of an extremely segregated field of study will clearly increase the degree of segregation. If this field is growing in numbers while slowly becoming more integrated, it may still contribute to overall segregation. If the growth in one field is more segregated than the average field, overall segregation will continue to increase, even though the particular specialty is becoming more integrated.

The growth in enrollment in certain professional schools is an instance of this pattern. Although dramatically more integrated than professional education had previously been, the growth of enrollment in professional schools such as law, medicine, and business did not

substantially exceed the average integration in master's and professional programs. In sum, despite the rapid growth and rapid integration of women into the professions, these fields contributed only moderately to a decline in sex segregation.

The curious exception to the general pattern of decline in sex segregation is the case of the Ph.D. degree. In this case more women are obtaining the degree than ever before, but the segregation of women and men by specialties has continued at the same (relatively low) level as before.

There are several possible explanations for the persistence of this pattern. As indicated above, the limited progress in bringing women into academia may be a factor in slowing the growth of women in male-dominated Ph.D. programs. There is a Catch-22 quality to this situation: Without more women, fields will remain male-dominated; as long as fields remain male-dominated, the impetus for women to pursue these fields is inhibited. Strong signals of opportunities for women need to be sent out in order to break this cycle.

Another important consideration is the dramatic increase in women in Ph.D. programs, which has the paradoxical effect of limiting the potential decline in sex segregation. The proportion of female Ph.D. recipients has tripled in the last 25 years. This means that the proportion of women entering male-dominated specialties must more than triple to cause a decline in sex segregation. As the pool of female Ph.D. candidates increased, the pool may have become more heterogeneous, with large numbers of women eager to become "pioneers" in male-dominated fields, but far larger numbers joining traditionally female specialties. Consequently, in the large group of new female Ph.D. candidates, although the number of pioneers has increased significantly, the proportion of pioneers has not grown. Clearly, there is a point at which growth of enrollments is so fast that it overwhelms the growth of "pioneering" women. Similar reasoning may be linked to the slow change in the level of occupational segregation by sex.

Another factor is the scarcity of women with undergraduate degrees from male-dominated fields. Because so many male-dominated technical fields are difficult if not impossible to enter without prior specialization in such areas, the proportion of women majoring in male-dominated specialties as undergraduates effectively serves as an upper bound on the proportion in Ph.D. programs. It is easier for a woman with an undergraduate degree in English to go to law school or business school than it is for her to enter a Ph.D. program in physics or economics. Thus male-dominated Ph.D. programs are not likely to benefit from women switching in at a late date and must await increased

numbers of women with technical specializations as undergraduates. With a several year lag required to obtain a degree taken into account, the large increase in women with B.A.s in math and science in the 1970s may well be about to produce a significant increase in women Ph.D. recipients in these male-dominated fields.

Other hypotheses put forth to characterize the relative segregation between field seem less plausible. Beller (1984b) has suggested that the degree of sex segregation is directly related to the proportion of women enrolled. This suggestion fits neither the trends over time nor the relative levels of higher education. Master's and professional degrees have a higher level of segregation and a smaller proportion of women than do bachelor's degrees. Doctoral degrees experienced an increase in the proportion of women without changing the degree of sex segregation. For bachelor's and associate degrees, the growing representation of women is coincident with a decline in sex segregation. The hypothesis of a direct relation between sex segregation and the proportion of women is not borne out in these data.

The trends described here also should not be viewed simply as paralleling other postwar demographic patterns for women. Changes in sex segregation in higher education do not closely follow increases in women's labor force participation, for example, because sex segregation in education increased during the 1950s while women's labor force participation increased. The evidence suggests specific links to the occupational prospects for women and the political context of higher education.

CONCLUSION

This chapter has examined trends in sex segregation among fields of study for recipients of associate, bachelor's, master's, professional, and doctoral degrees between 1948 and 1980. Sex segregation by specialty declined among associate, bachelor's, master's, and professional degree recipients, whereas sex segregation remained roughly constant among doctoral degree recipients. These changes commenced in the 1960s and continued through the 1970s. Throughout the period examined, sex segregation was highest among associate degree recipients and lowest among those with doctoral degrees.

The two most striking findings were the stability of sex segregation for Ph.D. recipients and the asymmetry in the experience of change by men and women. Men experienced a sharp increase in academic contact with women at all levels of higher education, in part due to the declines in segregation and in part due to increased enrollments of women. For

women, these two developments tend to counteract each other: Declining segregation results in increased contact with men, which tends to be offset by increasing enrollments of women.

Sex segregation was highest among associate degree recipients and lowest among Ph.D. recipients because of the corresponding segregation in the labor force and because the socialization experience afforded by college results in lower sex segregation for those pursuing higher degrees. The declines over time are due to the influence of the Women's Movement, not simply changes in women's labor force participation, and a variety of particular factors affecting each level of higher education differently. These data depict a complicated picture of trends in this period of time. No single factor completely characterizes the relative levels and trends observed.

This chapter has focused on comparisons between different levels of higher education. The data represent national averages. Clearly, interesting variations among institutions were pushed to the background in this analysis. Institutional variation remains an important area for the extension of this line of inquiry.

The evidence underscores the importance of longitudinal investigation of sex segregation in higher education. All too often research conducted in one college at one point in time is taken as characterizing important social or psychological generalities. Important as the contributions of this type of research can be, the dramatic changes of the past few decades in the fields pursued by men and women caution against generalizing from data from one college at one point in time.

These data can also help to provide a context for research that is not longitudinal in nature. By providing baseline data for sex segregation as well as outlining the predominant trends, the analysis presented here can enable researchers to put their results and those presented in the literature in the context of the overall patterns of sex segregation in higher education.

The data suggest that our nation's colleges and universities have experienced a much greater decline in sex segregation than has the American occupational structure. Whereas occupational segregation by sex has been quite slow to change over the course of the century, higher education has experienced substantial changes since the 1940s. Higher education appears far more susceptible to the influence of governmental decree and organized pressure groups than do private employers. Yet the formal equality of higher education continues to coexist with substantial segregation in the studies men and women pursue.

NOTES

1. 1952 is the first year detailed categories were grouped into major categories.
2. A small number of students receive undergraduate law degrees. Bachelor's degree data prior to 1961 do not distinguish between L.L.D. degrees and undergraduate law degrees. All were excluded from the pre-1961 data. This adjustment has a very small effect on the results.
3. When one groups 1971 data into the same categories as are available for 1966 data, the index of segregation declines a certain amount. The pre-1971 results were inflated by this amount to adjust for the change in categories.
4. In this volume see Sharon Harlan's chapter on nondegree job training programs, also characterized by a high degree of sex segregation.

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