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Gender Segregation in IT Occupations

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Abstract. The explanatory power of four theories about gender segregation is tested for IT-occupations in the Netherlands, which are studied for a period of four decades. Theories on occupational choices explain women's low participation in computer science, allthough entry requirements changed tremendously. Theories about employers' hiring practices explain the post-war recruitment of men in the female-dominated programmer's occupation, but not that employers went beyond gender boundaries because of labor shortage. Theories about the segregation code explain hierarchical gender relations. Yet, these have changed because of women's inroads into IT-occupations and because of the high proportion of women among non-professional users. Social closure theories explain why the professional community tries to keep a male image. Female computer professionals pay for their inroads into the high status and skilled male-dominated occupations by adapting to the male pattern of working hours and the male-dominated attitudes and by postponing maternity.

1 Introduction

Women's and men's paid work is highly segregated by occupation. In various disciplines occupational segregation has been studied. Long term approaches of desegregation and resegregation processes over time are probably the most promising analyses in this field. In general, findings indicate a strong tendency towards segregation between the sexes, and towards establishing hierarchical relationships between male and female occupations. In order to understand the segregation processes in one occupational group fully, in this paper four groups of theories that apply to segregation processes in occupations will be explored for their explanatory potential. These are theories about women's occupational choices, theories about employers' hiring practices, theories about male employees' segregation codes, and professionalization theories concerning closure strategies of professional communities. Each theory has its own particular view of who is the main actor involved in the segregation processes.

The similarities between these theories are that each is focusing on one actor in the gender segregation processes. A complex interrelationship exists between the main actors, e.g. employers,

predominantly male as well as the organizations they are heading, male employees and their organizations, either trade unions or professional bodies, and female employees and their organizations, all of them operating in a social environment. Moreover, these theories reveal conflicting interests in the segregation processes among and between the actors. Whereas it is usually suggested that all actors persist in continuous segregation, the theories show very dynamic processes.

In this paper we will test four theories for their explanatory power. The economic theories on employers' hiring behavior and employees' searching behavior explain the impact of supply and demand factors. The organizational theories focus on either personnel policies, male and female attitudes in organizations or group behavior. The psychological theories study occupational choices and socialization. The sociological theories usually are used to analyze professionalization and the exclusionary strategies of professional associations. These four theories are applied to the long term segregation processes in the field of Information Technology (IT) over five decades in the Netherlands. The IT occupations are chosen for several reasons: 1) the percentage of female workers changed over time backwards and forwards; 2) the occupations continuously had a masculine image; 3) the number of workers has grown tremendously; 4) entry requirements changed greatly; 5) organizational settings changed; 6) the occupations went into a process of professionalization. Gender segregation can be divided into hierarchical and occupational segregation, sometimes also called vertical and horizontal segregation. Hierarchical segregation refers to the unequal distribution of women and men across job levels, whereas occupational segregation refers to the unequal distribution over occupations. Here the focus is on occupational segregation, but when applicable hierarchical segregation will be discussed too.

2 Theories Explaining Occupational Segregation

One of the *theories on employers' hiring practices* is the statistical discrimination theory, stating that women are supposed to be more costly to employers than men due to higher turnover or absence rates because of motherhood. Because employers do not have any specific information about an applicant other than their sex, they will treat individuals on the basis of their group's average behavior (Arrow 1973). However, looking at wage costs, one would predict that employers would prefer women, because women's wages are on average far below men's. Bergmann (1989) specifies the statistical discrimination theory

by arguing that employers do not prefer women for male-dominated occupations and men for female-dominated occupations, because this would undermine the existing labor relations and status quo and this would be costly to employers. Thus, the theories on employers' hiring practices are not unanimous, they predict that employers prefer either male employees to female employees, female employees to male employees or men for male-dominated occupations and women for female-dominated occupations.

As far as segregation processes are concerned, employers' behavior is characterized by conflicting rationalism. If they prefer women due to lower wage cost, this would imply gender-based wage and employment competition, but occupational boundaries impede this general competition. If for wage policy reasons employers intend to substitute men's labor with women's labor, these occupational boundaries need to be broken down. However, male workers will organize themselves to resist substitution by strengthening occupational lines. On the other hand, female workers can organize themselves and demand equal pay for equal work by breaking down occupational boundaries. Thus, by reinforcing segregation, employers avoid vulnerability to labor unrest among male workers or client dissatisfaction, but at the same time this limits their possibilities of replacement and they would not meet female workers' demands. Therefore, it is most likely that employer's hiring strategies are in accordance with gender segregation. Because our study focuses on a male-dominated occupational group, we predict that employers will hire men for these occupations. Moreover, we predict that in the event of shortage of labor employers will go beyond gender boundaries.

Theories of professionalization offer an explanation to understand the process by which occupational groups define occupational boundaries. Processes of professionalization involve guidelines for recruitment and training, formal organization and informal relations among colleagues, and codes of conduct (Mok 1977). In two ways these process also include a gender identity. Professions will try to keep a male identity by exclusion strategies, and female-dominated occupations will not be defined as professions, following Etzioni (1969: vi) " .. the normative principles and cultural values of professions, organizations and female employment are not compatible". Usually the skilled female-dominated occupations are classified as semi-professionals, i.e. nurses, teachers. The theory of social closure has been elaborated by Parkin (1979). He distinguishes two groups in the process of social closure, both following their own strategies. The privileged group follows a strategy of

exclusion to keep their position by subordinating the groups they want to exclude. The subordinated group follows a strategy to appropriate some privileges of the former group. According to Witz (1986, 1992), these closure strategies include the establishment or maintenance of the exclusively male character of the professional community to protect the qualification structures.

Theories on the informal segregation codes focus on workplaces. The codes state that women should not exercise authority over men (Bergmann 1986). The segregation coding process includes two elements. The first refers to the code that supervising relationships at work should be in accordance with the hierarchical relationship between genders at home as well as in society: women should not exercise authority over men. The second element is that women as a group, in contrast to men, are perceived as non-hierarchical: men can exercise authority over men, women cannot over women. Workers, male and female, are likely to enforce these codes. Probably, they coincide with the code that young people should not exercise power over middle-aged people. Control over the sex-typing of tasks is instrumental in maintaining gender-related hierarchical structures in the division of labor within the occupational field (Kanter 1977, Cockburn 1983).

Economic and psychological *theories on occupational choices* focus mainly on female employees-to-be, and anticipating their behavior. Women, the economic argument goes, seek occupations in which the effects on their income will be low in case of a career break, whereas men do not seek these occupations (Polachek 1979). Therefore, women will have jobs with flat age-wage profiles (Jusenius 1976). Psychological gender-role socialization theories state that women due to their primary socialization choose occupations that are in accordance with their sex roles (Ireson 1978). Socialization is a process by which families, peers, schools and the media teach society's expectations to girls and boys. Thus, women are primarily oriented towards their families rather than their careers. In this sense, gender-role socialization explains occupational segregation because it focuses on gender-related occupational choices in childhood. This might explain why girls in contrast to boys do not choose occupations that might require mathematics or technical qualifications, whereas boys do not choose occupations in which caring is an important element. Thus, there would be hardly any women found in IT occupations, because these occupations do have steep age-wage profiles, they do require mathematical or technical skills and they don't include caring tasks. Moreover, one might expect girls to avoid occupational choices related

to subjects in the IT field, and that, as a consequence, women will not enter these occupational groups. In case qualifications change towards less technical or mathematical skills, desegregation processes will take place slowly, because girls need to become aware of these changes before they can change their occupational choice.

When analyzing gender segregation processes over time, four variables are examined in section 3: employer's hiring strategies, processes of professionalization, the use of segregation codes and finally women's occupational choices. In section 4 conclusions are drawn about the complex interrelationship between employers, male and female employees and the professional associations in IT occupations.

3 Segregation in the History of IT Occupations

In order to study gender segregation, IT occupations are defined using the International Standard Classification of Occupations (ISCO), which is meant to provide a structure for the classification of all jobs in the labor force, i.e. to group all jobs into successively broader categories. We consider four groups in four occupational groups as belonging to the IT occupations: the *system analysts* (ISCO code 083), the *programmers and other computer professionals not counted earlier* (084), the *card- and tape-punching machine operators* (322), which we will call key-entry operators, and the fourth occupational group, i.e. the *automatic data-processing machine operators* (342). Managerial occupations in the IT field were not classified as such.

3.1 The Late Forties and the Fifties: The Switch of Sex-typing

It was not until the end of WWII that scientists, all of them male, invented the electronic computer. This happened more or less at the same time in the US, the UK, France and Germany. The first computers in the world were mainly used for calculations for military purposes. The calculating work traditionally was done by mathematically skilled women, being a female-dominated occupation in a men's world (Hoffmann 1987, Shurkin 1984). Some of these women changed to programming, because they were the only ones who knew the structure of the calculations. Moreover, ENIAC, the first electronic computer in the US, was programmed by a female mathematician: Adèle Goldstine, and COBOL, the first programming language was written by a female physicist: Grace Hopper.

Programming was the first occupation in the IT field and it was a female-dominated job, although the work environment in the computer labs used to be male-dominated. When men returned from the war and women withdrew from the labor market because of marriage, men took over the programming jobs, as they did in quite a number of other occupations as well. Presumably this job was taken over (and others were not), because this one existed in an all male environment. Anyhow, in the fifties, the sex-typing of programmers' jobs had changed completely, although a few women still could be found in computer programming (Kraft 1979, Hoffmann 1987). Comparable processes were found in the Netherlands (Romeny & Van Vaalen 1988).

To summarize the four criteria: along with their changing tools the female calculators changed jobs to programming computers quite naturally. As conditions changed, i.e. male labor became abundant and women withdrew from the labor market, employers' hiring strategies changed, probably because the sex-typing of the job was adapted to the sex-typing of the work environment. Neither processes of professionalization, nor occupational choices, nor segregation coding, had yet started, because the occupation was so new.

3.2 The Sixties: Division of Labor

In the sixties, computers, mostly the IBM 360 series, were introduced in the Netherlands (see for a historical overview Kerf 1977, Tijdens 1989). Companies did not require complex calculations, but used these first computers mainly for repetitive calculations and to store data. Therefore, in companies the programming jobs were not a continuation of the calculating jobs as had been the case in the computer labs, but they made up a rather new job category. Moreover, for data storing purposes, data had to be entered for processing transactions. This was done by key entry operators, being a continuation of the card punch operating jobs. Diversification in the occupational field went further and a third IT occupation arose, because computer operating was separated from the programmers' job. Thus, the development of computer equipment was accompanied by a process of division of labor within the field of IT jobs. The number of workers rose, although at the end of the sixties there were still neither many programmers nor computer operators, but there were some key entry operators. Training for these first two occupations was usually provided by the equipment supplier. This division of labor could also be seen in the US and in other countries (Greenbaum 1976, Kraft 1979, Game & Pringle 1983).

In the sixties, the new occupations were pretty soon sex-typed. Van Oost (1994) has analyzed the process of sex-typing in one firm in detail. This firm's first computer application was expensive, risky and huge. It should not fail. The combination of the male image of IBM, which supplied the hardware, and the negative attitude to women's capacities in managerial jobs led to the selection of men for the programming jobs. It is harder to understand the male sex-typing for the operator's job. Van Oost (1994) suggests that operators were recruited in two shifts, because for reasons of efficiency it was decided that the computer had to be used day and night. Female applicants were excluded because they were forbidden to work at night by law. Another explanation is that the operator's job was defined being an attractive job. The operators were recruited from the department that dealt with the work flow before computerization, probably including card punch operators, and the operator's job was obviously seen as a promotion. Van Oost's study shows that male employees especially were promotion chasers and the women who wanted to be considered for the operator's job faced stiff competition from them. Obviously, employers' hiring strategies were mostly focused on the internal labor market. At the end of this decade, the programmer's and the computer operator's occupations were male-dominated, whereas the key entry typists used to be women.

The process of professionalization of the IT occupations started as the professional association was set up. As programming languages were developed independently from the computer equipment, they set up programming courses for workers in the IT field independently from the suppliers. A chain of certificates would ensure qualifications. Access to this vocational training system was limited to employees already having an IT job. Thus, these courses were not imbedded in the educational system.

3.3 The Seventies: Increasing Numbers of Workers in IT Occupations

In the seventies, computerization expanded tremendously: the number of mainframe computers multiplied by a thousand or more and so did the number of terminals. Because of this growth, the number of workers in IT occupations multiplied many times, especially among programmers and key entry typists. At the same time, the IT occupations underwent further diversification. The programming job required an increasing knowledge of information systems. In the late seventies, the systems analyst's job had to be distinguished from the programming job.

In the early seventies, many companies set up computer centers including IT departments, sometimes isolated from the rest of the company. Employers' hiring strategies changed towards the external labor market. Now, programmers usually were recruited among boys, leaving high school, but because of shortage of labor girls were sometimes recruited as well. Once recruited, the school leaver would become a qualified programmer by passing through a number of vocational training courses after which certificates of progressive advancement were granted. The systems analysts' jobs were a career step for programmers, if they had passed subsequent training courses. Key entry operators were also recruited externally, usually among young and medium skilled women, but due to labor shortage, employers were forced to recruit among middle-aged reentering women with outdated qualifications.

The sex-typing of the IT occupations did not change in the seventies. The programmers job remained a male dominated job, although women sometimes were recruited. The systems analysts were men, because only qualified programmers, usually men, could enter. The computer operating job was male dominated and the key entry job was female dominated. However, the gender segregation processes continued, now by setting up distinct organizational settings. As soon as data communication technology enabled separation of computer equipment and key entry terminals, the key entry centers were separated from the computer centers, for example in banking and insurance. Due to these distinct organizational settings the promotion chain from key entry typist to computer operator was broken. Moreover, due to the shortages in the labor market, the key entry centers were moved to regions with a larger labor supply. Thus, the male-dominated jobs were separated from the female-dominated jobs. At the end of this decade, 5.4% of the systems analysts were female, 7.9% of the programmers, 25.5% of the computer operators and 98.0% for key-entry operators (Tijdens 1996).

In the seventies, the professional association grew to maturity. It was involved in setting up certificates for the vocational training courses. Moreover, it defined its professional domain, as professional organizations usually do, by explicitly excluding key entry typists. By doing so the professionals kept their domain male-dominated and they defined their domain as skilled. They could have excluded the computer operators as well, defining them as manual work, but they did not.

3.4 The Eighties: Reaching into Higher Hierarchical Levels

During the eighties information technology spread rapidly and irrevocably in the business world. In the first half of the eighties, computerization was a continuation of the seventies, whereas its nature started to change in the second half of the eighties, when the dominance of centralized information systems using mainframe computers with terminals declined in favor of decentralized local information systems on microcomputers. As technology progressed, computer operating became easier and key entry tasks were taken over by optical character reading, by data entry by clients, by data entry at counters, etc. The number of mainframe computers demonstrated low growth, whereas in the first half of this decade the number of terminals increased very fast and in the second half the increase of microcomputers dominated growth figures. The number of IT workers multiplied, while unemployment was very low.

In this decade, the employment structure in IT occupations changed profoundly. Whereas the number of systems analysts multiplied by more than five times and the number of programmers by four, the number of key entry typists decreased slightly and the number of computer operators was at least halved. The increased number of computers and the increasing data to store did not counterbalance the decreasing need for computer operators and key entry typists. The expanding occupations underwent further diversification. The systems designer had to be distinguished from the systems analyst and programming was divided into application programming and operating system programming.

In the early eighties, full-time education in programming and computer science was set up at secondary, tertiary and university level. Moreover, because of high unemployment rates during the recession and the expanding number of employees in IT occupations, the government set up training courses in IT subjects for unemployed graduates. Thus, from the mid-eighties the labor market showed an increase in the supply of highly qualified people. The demand side responded by changing entry requirements from general secondary level qualifications into full-time secondary or university level business-oriented qualifications. As a consequence, qualification structures in IT occupations diversified. Moreover, the job ladder between the programming job and the systems analyst job was increasingly interrupted, because entry for the latter was limited to those having higher education. As the value of the stored information as well as the financial risks related to computerization increased, managerial levels in the IT field moved higher into the firm's

hierarchy. At the end of the decade, in large companies the board of directors usually included someone responsible for computer issues.

The sex-typing of the declining key entry occupation remained female, whereas women's share among the declining computer operator occupation decreased. Both occupations became low status groups in the companies. The sex-typing of the high status and fast expanding programmers' and systems analysts' occupations became slightly less male dominated. In 1987, 5.6% of the systems analysts and 10.3% of the programmers were female. This cannot be explained by girls' educational choices, because these remained low. Labor supply showed an increased percentage of women, because the courses for unemployed adults were a result of positive action and IT courses for reentering women were successfully set up (Van Hoek 1989, Biemans & Tijdens 1989). These women have taken advantage of the changes on the demand side of labor, as they did in all EU countries (Social Europe 1993). However, there are still only a few women at the managerial levels.

Professionalization went on as the occupational community defined the job titles in detail in 1986 in order to define their professional domain and the tasks within the domain. Increasingly, the systems analysts, the systems designers and the programmers could be characterized as a professionalized occupational group, whereas the computer operators were increasingly seen as a marginalized and non-professional group within the IT field. The key entry operators were already categorized as a non professional group. The professional community defined the qualification level of the IT occupations higher than ever before and stressed full-time availability within the occupations (Tijdens 1991). Obviously, this was not sufficient to keep women out of the occupational group. The women that entered the occupational group were young, they had no children and on average they were working nearly as many hours as men did, usually forty hours or more. The long working hours indicate that they had to make difficult choices when they wanted to have children. In the Netherlands during the eigthies it became common for women not to withdraw from the labor force, but to request for a reduction in working hours in their job. The female IT professionals were fully aware of these limited possibilities of working part-time (De Olde & Van Doorne-Huiskes 1991). They either had to withdraw from their jobs facing hard times in case of those re-entering or they had to negotiate individually with their employer for him to accept part-time work.

Employer's hiring strategies have been studied in detail in one insurance company (Tijdens 1991). Based on personnel data from 1981 to 1987, the figures show that with increasing computerization the company recruited more well-educated systems analysts and programmers. Their numbers as well as their educational levels at entry rose during the eighties. Quite obviously, the employers' hiring strategy was not limited to the recruitment of men, because also well-educated women entered the department, breaking through segregated occupations. In 1981, the IT department was a fully segregated department with female key entry typists, male computer operators, male programmers and male systems analysts. Six years later the department was less segregated, because the female entry typists and some of the male computer operators had left and a number of female programmers as well as female systems analysts had entered, changing the sex-typing of these two occupations slightly towards desegregation. As the IT department faced high turnover rates for women and low rates for men, we suggest that the gender differences in occupational careers will limit women's promotion prospects because of tenure-based requirements, but provide them with more opportunities to enter, especially when personnel composition for occupations changes. Thus, the female work force can react faster to changing qualification demands than the male work force, because a higher percentage of them is recruited per year. However, the progressive desegregation did not close fully the gender gap between the female and the male workforce in the EDP department. The gap in working hours has nearly disappeared, because women's working hours approach those of men, just as in the field of IT as a whole. The gender gap in wage groups decreased considerably, but the wage gap itself decreased only slightly. The gender gap in ages and tenure hardly changed during the eighties. In this respect, the employer did not break the segregation code.

3.5 The Early Nineties: Blurring Occupational Boundaries

From the end of the eighties, computerization became integrated in the companies' business because of end-user computing. The isolated organizational settings of the computer centers and the key entry centers were broken down in several respects. Key entry partly disappeared. Programming was partly contracted out, as can be seen from the growth of software houses as well as from the availability of packages that could be bought off-the-shelf. The isolated computer centers were partly replaced by information centers, which in many companies were

established providing support to end-users. Computer operating changed in favor of help desk tasks and intermediary jobs. Entry requirements shifted away from mathematical and technical skills, and away from company-related requirements towards more business-oriented qualifications with additional knowledge of information systems. Moreover, internal recruitment systems were replaced by external recruitment on all levels.

The occupational group was submitted to further changes. The distinction between professional users and non-professional end-users became blurred and so did their hierarchical relationship. Moreover, the category of non-professional end-users increased more than a thousand times from the end of the seventies to the beginning of the nineties, and became much larger than the occupational group (Tijdens 1994). Due to these changes, labor market demands shifted from computer science based qualifications towards business-oriented qualifications, for example, in areas where computer professions and business administration coincide. Moreover, the male-dominated computer science qualifications in the skilled IT occupations, as well as the male-dominated technical qualifications in the poorly skilled computer operators are no longer the only entry qualifications. In 1993, the percentage of females had grown to 8.9% among systems analysts and to 13.0% among programmers.

The nature of gender segregation in IT occupations is now changing. Among the non-professional users, the proportion of women is much higher -aproximately 50%- than among the professional users, and therefore women quite naturally enter the field of IT. Moreover, the changing entry qualifications are opening up opportunities for women to enter the IT professions. As women's share in computer science and engineering remained unchanged at low levels, their share in business subjects was considerable. This might be due to the fact that managerial jobs require years of experience, and women are still at an entry level of the career ladder, whereas men already had years of experience, enabling them to fulfill the requirements for managerial positions. On the other hand, research shows that here women face the same glass ceiling as they do in other occupations (De Olde & Van Doorne-Huiskes 1991). Nevertheless, as the latter research shows, female IT professionals seem to deny that in the IT field male-dominated attitudes prevail. Moreover, women with children are underrepresented, therefore we can expect that conflicts will arise as the women in the IT professions will grow older and potential care obligations will intervene more persistently with their careers. Because they are not able to solve

these conflicts at the moment, women in these occupations probably postpone maternity. Moreover, female IT professionals face a male-dominated culture and they adapt this culture in order to stay in the occupational group.

As the number of job titles in the IT field continued to increase and became blurred, the occupational community had defined the job titles in detail again in 1993. They had to redefine their occupational domain, now allowing job titles that did not cover the computer science only, and thus opening up the domain for women. Moreover, they were starting to loosen the factor binding together the occupational group, as declining membership shows. Professional identity became so diversified, that the association lost ist grip, and therefore was not able to define the occupational group as having a male identity.

4 Conclusions

Now conclusions are drawn about the explanatory power of the four theories as far as the segregation processes within the one occupational group is concerned. Before doing so, we will summarize the history of gender segregation in the IT occupations in the Netherlands.

Computer professional occupations have not been male-dominated occupations from the beginning. In the forties, the programmer's job, the origin of all IT occupations, was a female dominated occupation. It turned into a male dominated occupation in the fifties. From the sixties onwards the occupational group diversified. The female-dominated key entry operators and the male-dominated computer operators were split off from the programmer's job. In the eighties, the same happened to the male-dominated systems analysts' and designers' jobs. In the nineties, managerial levels in IT reached into highest organizational hierarchy. Moreover, from the eighties onwards, the isolated organizational settings were broken down. In the eighties and in the nineties, the job titles were defined by the professional community, and by doing so the professional domain was defined.

In the eighties and nineties, the two skilled IT occupations became professions, whereas the two low-skilled IT occupations, one being an all-female area in computing, were marginalized. One could expect women to be increasingly over represented in the marginalized occupations, but this is not the case. Moreover, women entered into the two skilled occupations, due to characteristics of labor demand favoring women. Within this time frame, women's share in computer science and engineering subjects in higher education remained stable, indicating that

women's educational choices did not change. Thus, they cannot be taken fully as an indicator for women's share in occupations. Research has indicated that women pay for these inroads into the high status and skilled male-dominated area's by adapting to men's pattern of working hours, by denying the male-dominated attitudes and by postponing maternity.

As far as the *theories on employers' hiring practices* concerned, it was predicted that employers will hire men for the male dominated IT occupations, but in case of shortage of labor they will go beyond gender boundaries. Our historical research has shown, though, that employers were likely to recruit male employees for the female-dominated programmers occupation because of labor supply factors after WWII. In the late forties, employers' hiring strategies included recruitment for programmers among men, probably mainly due to supply factors. In the fifties and sixties, internal recruitment prevailed, and the sex-typing of IT occupations was established. In the seventies, employers' hiring practices included recruitment among non-traditional groups, i.e. women, for the male-dominated programmer's job, because of labor shortage among men. However, as shortage waned, men were recruited only, and the number of women in the occupations was not enough to 'survive'. In the eighties, women were recruited for the male dominated occupations because of a increasing labor supply, that included women, directed into these occupations. In the nineties, women were recruited for the male dominated occupations because they fitted the changing entry qualifications. Thus, supply factors influence employers' labor demand as far as recruitment according to sex typing is concerned. Due to changing entry qualifications women were sufficiently educated to fulfill this labor demand.

As far as the *theories on professionalization* are concerned, the community of Dutch computer professionals showed that it tried to maintain the occupation's male image in two ways. The strategy to control occupational boundaries as part of the social closure theory was confirmed as the community very clearly stated that the key entry tasks did not belong to the occupational field, which they mainly did in the seventies. By doing so they excluded the key entry typists, being an occupational group with mainly female, poorly qualified workers in the IT field. Another low status IT occupation, the computer operators, was not excluded as explicitly as the key entry operators were. Therefore, this can not be interpreted as an attempt to remain a high status occupational group, it is an attempt to maintain the occupation's male image. Secondly, in the eighties the community stressed several times

that the workers in the profession must be available full-time. Thus, the community does not exclude women, but it excludes groups in which women are the majority, either being key entry typists or part-time workers.

Looking at the *theories on the segregation code*, our study of the IT department shows that although the employer recruited women he did not break the segregation code because the men in the department were on average older and had more years of service than the women. The F/M rate hardly changed in this respect. Thus, the segregation code theory seems to be useful for jobs that are part of company's hierarchical lines, but it does not serve for professional occupations. For the IT professions this mechanism is revealed by the fact that women are able to enter the professional field, but are rarely to be found at higher managerial levels. Nevertheless, something can be said on gender relations in the IT field in general. In the seventies the terminal was the most extensively used piece of computer equipment. Male workers in skilled jobs used terminals mainly for systems analysis or programming and they designed and controlled the computerized information systems, whereas female workers used terminals for key entry processing and were regarded as marginal users in unskilled jobs (Bird 1980). Therefore, gender relations within the field of information technology were extremely hierarchical. By the nineties, the gender relations in this field had changed. They are no longer as hierarchical and male-dominated as they used to be, partly because of women's inroads into the IT professions, partly because of the considerable proportion of women in the hugely increased category of non-professional end-users.

As far as the *theories on women's occupational choices* are concerned, the theory that women seek jobs in which a career break does not affect their income might explain that women are underrepresented in the computer professions, because these professions have steep age-wage profiles. However, in the Netherlands women's attitudes towards paid work have changed since the late seventies, because increasingly they decide to have a working career instead of a home making career, and therefore will seek occupations with a steep are-wage profile as men do. This also might explain the rising proportion of women in IT occupations. As argued, women's share in computer science and engineering subjects remained stable, indicating that women's educational choices did not change. Therefore, women's participation rates in computer science and technical subjects will only partly predict their participation rates in IT occupations. It is quite reasonable that women's share in IT occupations has increased while

this was not the case with their share in computer science. Theories on women's occupational choices hardly are able to explain sex segregation processes in such fast changing occupations as, for example, the IT field. The theory can explain women's low participation in computer science, but since this is not the appropriate subject as it used to be, the theory does not fully explain women's share in the occupations.

To conclude, the dynamics in the occupational IT field are expressed in the rise and fall of employment figures, the diversification of the occupational groups, the shifts in entry requirements, the shift from internal to external recruitment, and the segmentation processes as far as promotion chains are involved. Labor supply and demand were found as relevant factors for explaining resegregation and desegregation processes. Women's educational choices were found not to be fully indicative for women's share in occupations as entry requirements changed. Mature women are obviously less reluctant for gender-role socialization as girls are. Women's very low share in the increasing managerial level of the IT occupations could be explained by the segregation code theory, but this theory does not apply to the profession as such. Social closure theory seems to be adequate to explain the masculine image of the occupational group, because the professional community defines the profession as having male characteristics. This strategy did not lead to a total exclusion of women, but to adaptation of the male-dominated culture on the part of the female IT professionals.

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