

AGING, WORK ORGANIZATION¹ AND HEALTH²Hélène David¹, Serge Volkoff², Esther Cloutier³, Francis Derriennic⁴1. helene.david@grasp.umontreal.ca

GRASP (Groupe de Recherche sur les Aspects Sociaux de la Santé et de la Prévention)
 Université de Montréal
 2801-15 Edouard-Montpetit, Local 167
 Montréal (Québec), Canada

2. volkoff@cnam.fr

CRÉAPT-CÉE (Centre de Recherches et d'Études sur l'Âge et les Populations au Travail-
 Centre d'Études de l'Emploi)
 29, Promenade Michel Simon
 93 166 Noisy-Le-Grand CEDEX
 France

3. cloutier.esther@irsst.qc.ca

IRSST (Institut de Recherche Robert-Sauvé en Santé et Sécurité du Travail)
 505 Ouest, Boul. de Maisonneuve
 Montréal (Québec), Canada H3A 3C2

4. derriennicf@vjf.inserm.fr

INSERM, UFR 12 (Institut National de la Santé et de la Recherche Médical)
 16 avenue Paul Vaillant Couturier
 94807 Villejuif CEDEX

(Translator: Helen Shaver)

The crucial question is not whether you are getting older, which has no meaning in itself, but at what point you become "too old" for the social requirements that you can no longer fulfill.

Teiger, 1990

INTRODUCTION

Aging of the workforce is mainly determined by the conditions under which work is done (Teiger, 1995), and these are rarely specific to the jobs in which aging personnel are found. To identify the main issues, it is therefore important to briefly consider the effects of major changes in employment and in the workforce on work-related organizational choices in advanced industrial societies: demographic changes, the evolution in job sectors and technology, the methods of company management, and the contribution of political institutions to these changes. Once the general trends in the main areas of change in the working world have been identified, their specific effects on aging personnel will be briefly listed. The second part of the paper will then discuss in more detail the main issues raised by the relationships between aging and the organizational choices involving the actual work activity.

I- THE MAJOR CHANGES IN THE WORKING WORLD

Demographic changes

The demographic changes that are signaling a more rapid aging of the population and workforce make reflection and interventions a priority with companies and aging personnel. It is important to assess the consequences of foreseeable changes, which will increase over the coming decades, and to examine how the working community can and must deal with the new and lasting phenomenon of an aging workforce. Also, these demographic changes are not occurring in a vacuum. They must therefore be analyzed and understood by considering the major changes that have been affecting the working world over the last few decades.

Four major changes characterize the general demographic trends that are currently affecting the workforce: aging of the population, resulting in an aging workforce; the narrowing of the workforce's age pyramid; young people who are more educated; and finally, the feminization of the workforce.

Aging of the population and workforce

Aging of the workforce is a general trend both in Québec (David, 1990; Légaré and Martel, 1996) and in France (Molinié, 1995; Molinié and Volkoff, 1995); the proportion of older people has begun to increase and will continue to do so for a long time. The

effect of the baby boom (the large increase in birth rate after the war until the early 1960s) has had a lot to do with it. For example, in Québec, the median age of the total population increased from 26 years in 1971 to 36 years in 1996 (Duchesne, 1998). Subsequently, a significant decrease in the birth rate has also contributed to this increase for several decades. The workforce nevertheless remains younger than the total population due to different mechanisms of exclusion of older workers from the workforce, but the workforce is also beginning to age (David, 1990).

This aging of the total population and workforce is raising concerns about the expected increase in social security costs. It is also fertile ground for negative social representations about retired or older people (in terms of gaps or excessive costs). At the same time, and in a contradictory way, there are increasing negative social representations about aging people who continue to work, even if they are helping to reduce these social security costs (Teiger, 1995).

Increasingly educated young people

In France, two factors, different depending on the age group in question, contribute to the demographic effect (Molinié, 1995). Within the workforce, they produce age pyramids whose base (young people) is shrinking, while the expanding middle will be followed by an expanding peak (elderly). With younger people, it is the trend to increasing education and the difficult school-to-work transition that further reduce their low numbers in the workforce. In 1996 in Québec, only 25% of 25- to 29-year-olds had not completed secondary school, compared to 56% in 1981, and in 1995, the employment rate for 20- to 24-year-olds was 62% (BSQ, 1998). Some twenty years ago in France, the participation rate of 20- to 24-year-olds was close to 80% for men and 65% for women; today, these percentages are close to 55% and 45%, respectively. This mechanism will have less impact in the future if the youth unemployment rate decreases and if the trend to more schooling results in a relative stability (this is the most commonly accepted hypothesis). But it is unlikely that this shift will affect the age structures in companies, to the point of again calling into question the general aging trend.

More schooling is a long-term trend related to industrialization. Its importance is increasing even more in the new information economy. In fact, different countries' positions in the international

division of work, based on the networks and flows that span each country, depends more and more on workforce characteristics, including knowledge, thus making education and training even more vital for the new generations (Molinié, 1995; Castells, 1998; Kumar, 2000).

This increased education of young people, in an economic context in which managers are seeking numerical flexibility and value a qualified workforce, is creating conditions that aggravate tensions and intergenerational conflicts and that intensify the exclusion of aging personnel as well as justify it (Tindale, 1987; Beaud and Pialoux, 1999).

Narrowing of the workforce's age pyramid

Behaviors of the different age groups are strongly reoriented by decisions of companies with the power to hire and fire, as well as by governmental policies. The increase in aging personnel within the workforce is countered by a high rate of early departures from the workforce, which are strongly encouraged.

For a few decades now, the combined effect of public and private policies has resulted in a high proportion of the older generations permanently leaving the workforce earlier than previous generations. In France, between 1968 and 1990, the participation rate of 55- to 59-year-olds dropped from 82% to 70% for men, while it increased slightly (from 42% to 46%) for women, due to a generation effect. During the same period, the participation rate for 60- to 64-year-olds dropped from 66% to 21% for men, and from 32% to 17% for women (Choffel, 1994). In Canada in 1998, the participation rate for men 55 to 64 years of age was only 56% (36% for women). This is a 20% decrease over twenty years for men and a 6% increase for women (Statistics Canada, 2000). For Canada as a whole, the desired retirement age is now 58 years of age, which is significantly lower than the average age at which employees actually retire (62 years of age) and the official age (65 years of age), according to McDonald (1994). At the present time, this phenomenon, as well as the low youth employment rate, are trimming the workforce's age pyramid at both extremities, with the effect being to concentrate it in the average age brackets. However, middle-aged employees continue to age (Guillemard, 1995; Molinié, 1995; BSQ, 1998). At the same time, the life expectancy of the elderly continues to increase. In Canada in 1996, it was 18.4 years for people 65 years of age, or three years more than in 1971 (Statistics Canada, 2000).

This narrowing of the workforce's age pyramid, mainly due to massive retirements, is resulting in a considerable loss of job competency and know-how. Considering the significant increase in overall life expectancy and particularly good health, a large proportion of the personnel that leave the workforce could have continued to work.

Feminization of the workforce

The participation rate for women 25 to 45 years of age now exceeds 75% in Québec (BSQ, 1998) and is close to 70% in France (Eurostat, 1997). In its size and variations with age, it increasingly resembles the rate for men. However, despite major changes, women are not in the same jobs as men. They also have more unemployment, underemployment and precarious employment (Maruani, 1995).

This feminization of the workforce is occurring without the disappearance of gender division in employment and work, despite the reduction in some differences in employment and working conditions. From 1976 to 1996 in Québec, for example, self-employment increased by 132% among women (60% for men), and in 1996, 70% earned less than \$10,000 per year; this was the case for only 28% of men (Payeur, 1998).

The participation rate has increased dramatically, mainly for women with children (BSQ, 1998). This change has contributed greatly to the development of the service sector because, in the

commercial and public sector, these services often replace those that women carried out in their families. Also, many women are salaried employees in this sector. In Québec, in particular, the growth rate of the workforce is higher than that of the total population, in large part due to this dramatic increase in the participation rate of women (David, 1990).

At the present time, very little is known about the specifics of aging of the female workforce; nevertheless, exclusion is known to be more extensive and occur earlier in sectors and jobs where there are more women (Teiger, 1989). In their analyses, studies on aging of the workforce must therefore take into account gender as well as the gender division of salaried and domestic labor (David, 1994).

The evolution in employment sectors and technology

The major employment sectors

Profound changes are occurring in the economic structures of mature industrial countries. The tertiary sector now represents from 60 to 74% of employment in the G-7 countries, while the secondary sector accounts for only approximately 28% (according to the OCDE, 1997, cited by the IQS, 1999). Industrial employment, however, will not necessarily continue to decline. According to analyses on the emergence of this new mode of development, the manufacturing industry, which is undergoing major technological changes, is essential for productivity. It is likely to remain and to play an important anchoring role for many services. The primary sector, which represents only 2 to 4% of employment, is increasingly subjected to the production standards of the industry downstream and integrated into it (Castells, 1998; Pinard, 2000).

Analyses of the new economic trends are predicting that some already established trends will continue. They are:

- the gradual elimination of agriculture;
- the regular decline in traditional industrial employment;
- growth in services to companies (particularly business services) and social services (particularly health);
- an increased diversification of the service activities creating new jobs;
- a rapid increase in the number of managers, specialists and technicians;
- the creation of a proletariat of white collar workers consisting of office and sales employees;
- a relatively stable substantial proportion of retail business jobs;
- a simultaneous increase in the upper and lower levels of the occupational structure;
- a relative increase in the overall level of the occupational structure over time (Castells, 1998)³.

The changing weight of the different sectors is having a specific effect on aging personnel. Evidence of the decline in the manufacturing industry, whose workforce consists mainly of men, is the shutdown of complete industrial branches, mass layoffs and even early retirement programs. Aging female and male workers affected by these processes have a difficult time finding work.

In services, whose ratio is increasing, the work requirements and constraints are different from those in industry, although the recent work changes tend to reduce these differences. Service jobs are to a large extent held by women.

Technological changes

The changes in employment are related to the introduction of new technologies whose role is much greater than before. Data from recent surveys in Canada and the United States indicate

that the current wave of changes began in the 1980s and increased during the following decade. The extent of these changes clearly varies with the size and industry of the companies as well as with the strategies chosen by their managers. These changes are more widespread in the manufacturing industry and are associated with numerical and functional flexibility practices. These new work and management practices can affect from one third to one half of companies. The main practices are reductions in staff, subcontracting and on-call work (Kumar, 2000).

The most recent surveys in Canada (Statistics Canada, 1998; Ekos, 1998; Kumar et al., 1998) reveal that 90% of employees have been affected by organizational changes. More than 25% of the companies reported that they had reduced their personnel, modified their work organization and made use of functional flexibility, which has affected more than half of their staff. In addition, close to 20% of all the surveyed companies reported using subcontracting and flexible schedules. These practices are more common in large companies. Thus, 60 to 80% of them have implemented numerical flexibility procedures, in particular part-time or on-call work and overtime work (Kumar, 2000).

Computerization and automation are adding new physical and cognitive constraints to those already present in workplaces. According to the most recent survey on working conditions in France (1998), automation now affects approximately one third of workers, regardless of sector. It is accompanied by new constraints (directly related to the technology or economic efficiency) without eliminating difficulties or risks. Computerization, which involved half of the employees in France in 1991, reduces the difficulty, but does not reduce risks and adds to the mental stress of manual tasks (Gollac and Volkoff, 1996).

Some surveys of workers or union organizations in Canada provide additional information on the consequences of these changes on personnel (Kumar, 2000; Kumar et al., 1998). Overall, innovative practices are generally associated with higher salaries and benefits as well as with a higher unionization rate. However, while functional flexibility is also associated with higher salaries and more work hours, numerical flexibility is associated with lower salaries.

The results of the surveys on unions and their members indicate that it is generally felt that a deterioration in the quality of working life has occurred. Mainly reported are an increased workload and pace, loss of control and autonomy, increased physical and affective stress, as well as concerns about occupational health and employment. These are associated with numerical and functional flexibility practices. At least half of the respondents felt that they had little control over their work and said that they were tense. Forty percent felt that they had an excessive workload, and just as many felt that they had to work in uncomfortable postures at least half of the time. Finally, one third of the respondents stated that they had to work at too fast a pace and just as many said that they felt pain during their work at least half of the time.

For aging personnel, the work requirements and constraints resulting from the growth of new technologies are far-reaching. As Teiger (1989) and Laville (1989) pointed out, aging of the workforce is the result of male and female workers having to deal with a functional change in a job modeled by its content and its execution conditions as well as by its social and economic characteristics. Some physical and mental requirements often become excessive, considering the background of aging personnel, such as poor initial training, which affects their physical and mental capacities. Requirements may also be excessive due to gaps in job training and the exclusion of aging personnel from these activities (see the pages on learning and professional training below). Such situations stir up some issues raised by workforce demographics. In the current economy, the increased importance of knowledge (Touraine, 1999) in particular, helps polarize generations against one another, while the introduction of new knowledge-transmission mechanisms is delayed (Carnoy, 2000). For this reason, some believe that this confers a great responsibility on governments and social partners (Carnoy, 2000; Castells, 1998).

The importance of services

The increased proportion of service jobs, as compared to production jobs, does not mean that difficulty disappears. As early as 1991, the French survey on working conditions indicated that half of service employees said that they had to carry heavy loads, and twenty percent also reported having to meet production standards with a time horizon of less than one day. One third of employees in personal services stated that they had to maintain uncomfortable postures.

These different observations, as well as others that will be mentioned about work, prompt some observers to comment that there is increasing hybridization between manual work in the secondary sector and the tasks in service jobs. Right now, there is more and more physical difficulty, work under time pressure and industrial standards, whereas before there was only direct contact with clients. Sociological analyses are also noting that in many service jobs, physical and mental work cannot be differentiated because the tasks in these jobs often require both (Gollac and Volkoff, 1996).

Issues poorly understood in services

Until just recently, the occupational sciences, which mainly developed from studies in major industry, have addressed the tertiary sector and service jobs as an undifferentiated residual unit. With the continuing growth in this type of employment, observation and analytical work become a priority in order to provide a conceptual basis for differentiating dissimilar types of jobs and tasks (Offe, 1985; Castells, 1998; Pinard, 2000).

Among the economic and sociological analyses of the developing information society, some authors have proposed differentiating, for example, between: distribution services (commerce, communications, transport), services to companies, social services that are related to collective consumption (most often governmental), and finally, personal services that are related to individual consumption (Castells, 1998). Resistance from some professions to attempts at control by the organizations that introduced them, as well as their ambivalence, are also highlighted (Offe, 1985). Others stress the importance of analytical work on the people present at the time of the work activity as users, and who are, as such, a component of the work activity (Offe, 1985; Maheu and Robitaille, 1991). In ergonomics, some researchers have begun reflection to characterize the tasks in service jobs in which a service relationship exists between an operator and a user who is his partner (Falzon and Lapeyrière, 1998), which is the case in a very large proportion of these jobs.

Although the current age structure in services is significantly younger than in industry, the problems of aging of the workforce are just as common (David and Bigaouette, 1989; David and Payeur, 1995; Cloutier et al., 1999; Davezies, 1998). Most often they involve female populations. However, despite their high number, the conditions of an aging female workforce in services and their consequences are rarely identified and analyzed.

Methods of company management

Employment

According to some observers, we are not currently witnessing the end of work, but the end of a process of structuring professional and non-professional activities (Mercure and Dubé, 1997; Kumar, 2000). This new process is probably characterized by the plurality and breakdown of employment statuses as well as by the change from work time to employment and subsistence time (Thommens, 2000). The wide variety of job time structures may be due to the fact that now, it is the variations and variability in production that are creating the time frame for occupational activities (OCDE, 1999). Thus, there would be a marked difference between working time and employment time. In France, close to 90% of the workforce was still salaried in France in 1991 (Gollac and Volkoff, 1996), while in Québec, full-time wage-earning employment dropped from 83% to 72% of the total employment between 1976 to 1995 (Matte, 1998).

The workday and workweek are generally being challenged. This has to do not only with time, but also with workload, remuneration and a condition associated with guarantees and rights (Payeur, 1998). The collapse of this standard produces methods of remuneration whose only referent is now the market (Castel, 1998).

For aging personnel, the new job structuring method can be very painful due to new constraints such as variability in production, which increasingly determines the time framework for occupational activities. Subcontracting promotes youth employment. However, these young people are replaced over the short term, and are required to perform at a high work intensity, which also jeopardizes the job security of aging personnel with more seniority, and indirectly increases their workload.

In the automobile industry in France, subcontracting promotes the employment of young and better trained labor, which is rapidly rotated and less well paid (Pialoux, 1996). In Québec, a study on the use of private home health care and hygiene agencies notes that for a given job (prescribed), employees of private help and health care agencies are much less well paid than those in the public health system. They also have split schedules, often different from the day and week schedules, with neither job security nor benefits. Being less qualified, these employees keep their jobs for a shorter time. The pool of employees with an insecure status serve just as often as “stock” for companies that recruit from agencies and for regular jobs, salaried employees whose behavior is more in keeping with its selection criteria (David et al., not yet published).

Supervision

Earlier attempts to transform market fluctuations into regular throughput have now given way to strategies in which company managers pass on these fluctuations to the lower rungs and manage them with refined human relations techniques based on the participation and involvement of salaried employees (Kumar, 2000). Changes in control procedures, such as quality circles or procedural autonomy (often associated with participatory management or semi-autonomous work teams) may seem to correspond to an improvement in working conditions. The opposite effect is also possible when new forms of competition simultaneously put constraints on work paces. By associating procedural autonomy with time constraints, managers relieve themselves of contradictory “choices” and impose them on the workers. The latter simply have to “choose” the most rapid method, since the other methods that would have made their work easier would have disappeared under the effect of the irreconcilable demands of quantity and quality. For example, this is the case when a shop operating according to tight flow principles has quality standards simultaneously imposed, such as ISO standards (Lefebvre, 1996).

Methods for justifying “work flexibility” are necessary for the new mechanisms to be accepted and for ensuring that they work. Complex series of professional and extra-professional standards of conduct and for inculcating new company-related cultural standards (loyalty, adherence to its values and objectives, participation, temporal availability, personalized controls of productivity in a perspective of “excellence”) are then often implemented by company executives.

Changes such as the introduction of production standards, which limit the work strategies by which aging personnel can remain on the job, force the latter to adopt the fastest operating method and not the most appropriate one for their skills. Production guidelines, associated with changes in work organization, just as often have the effect of polarizing the youngest against the oldest workers (Pialoux, 1996).

The work

In the debate on the future of work that is dividing this research milieu, some researchers emphasize that in the emerging informational society, the increased role of technology has the

effect of making work problems even more important (Bidet and Texier, 1995; Freyssenet, 1995). The pivotal nature of work as a means of constructing the self as a free player may conflict with market and competition logic. Demands for negotiated autonomy, continuity and definition of the rules for a job that is becoming professionalized would then conflict with the production flexibility requirements (Castel, 1998; Touraine, 1999).

Work intensification is one of the problems that persist through changes in the work, under a more capitalistic production process than ever. "Just in time" inventories, demand pull, tighter control of individual and collective productivity, and operation with minimum staff are the new ways in which this intensification is established (Pialoux, 1996). The data from the 1991 French survey on working conditions identified some work intensification indices and showed how, through demand pull, in addition to the pressure of scientific work organization, time constraints increased where they already existed and appeared where they did not exist, as in services (Gollac and Volkoff, 1996).

Intensification of constraints is continuing in the direction opposite the social hierarchy because, the lower the qualifications and the more low-rung jobs, the stronger the constraints. Some studies in metallurgy have shown the effects of work constraint intensity, mainly by introducing an organization based on tight flows (Lefebvre, 1996). In this sector, a major reduction in interest in union action as well as in the working group's social rituals, which contribute to social cohesion, would be due to the limited choice of rest periods, to the irregularity of work paces, and to job insecurity. Simpson (1999) describes the same trends in the United States. Several studies show that these factors contribute to the change or increase in occupational risks according to sector and profession. Right now, we are witnessing an increasing complexity of demands and work, resulting in many physical and cognitive constraints that the workforce has to deal with to do the work efficiently and safely (Gollac and Volkoff, 1996).

Several studies have demonstrated for a long time that the effect of such constraints may contribute to the exclusion of important segments of the labor market, mainly for occupational injury, professional dequalification and age (Teiger, 1989). At the present time, this phenomenon is even increasing (Teiger, 1995). However, in order to obtain collective rights for those excluded and to improve their working and employment conditions, new forms of resistance and conflict are appearing because the traditional types of action have lost some of their effectiveness with these changes and do not tend to renew themselves (Payeur, 1998; Fontan and Klein, 2000).

Politics: practices and ideologies

Policies and practices

When globalization is considered for what it is, namely the deliberate expression of private interests as well as the interests of the people in power in many countries and not an exogenous factor that imposes its constraints on nation-states, it becomes clear that the governments of nation-states play an important role in the different forces that are orienting the major changes in the working world (Théret, 2000). Convincing data indicate that technological changes do not determine the future of work and employment. Some comparisons of the G-7 countries, for example, clearly show that the unemployment rates and occupational structures in these different countries are related more to existing social forces, institutional mechanisms, and historical traditions than to the penetration rate of the new technologies (Castells, 1998).

Failure of the social contract of the different national systems in fact takes on varied forms that emphasize either the abandonment of universalist logic, or the deregulation of salaries and a reduction in occupational protection, or even the maintaining of benefits, which weakens the newcomers on the labor market (Esping-Andersen, 1996). Weakening of labor law, in the face of the employer offensive to establish as much flexibility as possible regarding the objectives of profit maximization, and its inadequacy in the face of the new uncertain employment conditions,

is well known. It could be corrected so that it continues to play an important role in the social regulation of labor relations (Castel, 1998).

At the present time, the prevailing situation is somewhat the opposite: according to numerous analyses, union weakness is contributing to salaried employees not being able to effectively fight their deteriorating working conditions. In many countries, this deterioration is in part due to the active intervention of the state in deregulating plans to protect labor standards, jobs and markets, at the same time as the welfare state is being dismantled (reduction in social protection, additions to the benefit access criteria of most of the social welfare plans, and increase in access thresholds). To oppose this separation between work and welfare rights (Castel, 1998), new mobilizations are appearing (Fontan and Klein, 2000).

In the context of this disintegration of work-related rights, including the reworking of several income security mechanisms such as employment insurance, some changes that apply to the entire workforce are affecting aging personnel in particular. In Canada as well as in France, aging personnel, even though they have a lower unemployment rate than younger people, are unemployed longer when they are out of work. In Québec in 1997, 25% of the unemployed male and female workers 45 years of age or older had been unemployed for more than a year, while this was the case for only 6% of those from 15 to 24 years of age (Grenier, 1998). Paradoxically, the right to retire, which has been won by a hard fought struggle, has become a valued social institution, allowing the right of aging personnel to work to be ignored because companies can now justify terminating their employment, stating that these salaried employees will have other sources of income (Kohli, 1990). Also, the changes in the means of retirement and in income security at retirement weaken their situation (Firbank, 1997).

The ideology

A well-structured and constantly molded dialogue is accompanying the government's dismantling of the welfare state and market deregulation. On the one hand, it contains a critique of the welfare state whose economic interventions may be a deterrent to the private initiative of companies and may alter the rules of competition by unduly supporting companies that should not survive. Regarding the workforce, on the other hand, this dialogue justifies the reduction and abolition of certain income security measures. The effect of valuing individual autonomy is the imposition of standards and individual behaviors considered as "responsible", which the citizens are now supposed to adopt at work as well as in retirement. The measures in question would also encourage passivity and excessive dependence on the state.

The changes in government are accompanied by dialogue that attempts to justify them. For aging personnel, this dialogue basically addresses retirement. Although retirement is currently considered as the right to a stage in life between the end of working life and very old age, it is also seen as a duty that should be fulfilled without delay in the name of intergenerational equity. The possibility of choosing the time and conditions of retirement is thus often reduced.

Considering the rate at which the workforce is aging, an attempt must be made to regulate the market and its hegemonic initiatives in order to exercise some control over it again; this is because work and employment remain a major strategic issue for aging personnel as well as for the other components of the workforce (Bidet and Texier, 1995; Freyssenet, 1995; Castel, 1998; Touraine, 1999).

This general picture indicates to what extent major changes in work affect aging personnel; this issue will be discussed further in the second part. It targets six major aspects that are particularly important for aging personnel, which involve work organization.

II- ACTUAL ISSUES IN THE RELATIONSHIPS BETWEEN AGING AND WORK ORGANIZATION

INTRODUCTION

The relationships between aging of the workforce and work organization do not cover all facets of aging of the workforce, but it is a central aspect—to which others are linked—that is best for understanding the extent and importance of the question of aging of the workforce. The human body changes over the years. The argument cannot be made that the functional state of each man or each woman at work does not change. Advancing age increases the probability of a reduction in functional capacities, in such aspects as maximum muscular strength, the amplitude of joint movement, sight and hearing, sleep regulation, and performances based on short-term memory or on making many decisions in a limited time frame. Right now, available knowledge is providing rather subtle assessments of these phenomena (Laville, 1989; Millanvoye, 1995). It is showing that moderate changes are often involved (if only ages of professional activity are considered), varying with the individual and the job studied. Everyone has his own rate of aging, so to speak.

Work plays a role in the expression of the effects of aging. The deterioration that has just been mentioned can in part be induced by work. Conversely, well-adapted working conditions and work organization may have a protective effect on certain deteriorations in health. However, work may also play a revealing role. This is because it is mainly the maximum performances that are declining. In fact, depending on the organization adopted, work will require, more or less often, these extreme levels of performance, namely having to deal with particularly difficult physical or mental requirements. All this will be demonstrated by the fact that certain work requirements cause specific difficulties for older people, even age-related selection mechanisms, while in sometimes similar work situations, no disparity of this type arises (Laville, 1989).

The unequal life expectancy according to occupational category, which does not seem to be due to any specific cause of death, remains significant between executives and workers despite the reduction in mortality rates in all social groups. Also, despite the fact that socioprofessional category does not address only the work, the hypothesis can be made that there are deteriorations in health that appear more or less early in age based on occupational factors.

From an epidemiological standpoint, observation of these changes in health is not easy because it assumes that there are prospective cohort studies based on large random samples in order to obtain minimum statistical power. Such a survey (ESTEV investigation) was conducted in France on a sample of 20,000 salaried employees of both sexes born in 1938, 1943, 1948 and 1953. The subjects were questioned in 1990 and 1995 using self-administered questionnaires on work (occupational exposures, conditions at work, and psychosocial work factors) and health (Derriennic et al., 1996).

The main health aspects explored involve the different components of perceived health described by the indicator in the Nottingham Health Profile, musculoskeletal disorders and high blood pressure.

In these different areas, for men as well as for women, the results suggest differences related to socioprofessional category because female and male workers have higher prevalences than middle managers. “Age” effects that are independent of “generation” effects are observed for sleep and physical mobility problems. The emerging age-related trends argue even more for the early effects of aging rather than for a change in work pace during advancing age.

From the results obtained, after adjustment for age and socioprofessional category, it is clear that for each sex, these health problems depend at the same time on the work's physical requirements or constraints (carrying heavy loads, efforts on tools, constraining postures, etc.) that affect physical mobility, the work schedule requirements (alternating, atypical schedules, etc.) that lead to sleep problems, and on other organizational choices such as the decisional latitude and high psychocognitive demand that characterize many workstations (Karasek's

model) and that are also associated with an increase in these different health problems.

Under these conditions, these problems, which can be related to the content of the deficiency and incapacity concepts developed by the WHO, and which become particularly prevalent in older ages, probably take root early in working life. On the one hand, work life exerts its influence through specific risk factors, associated with injuries or specific changes in health. On the other hand, they come into play more generally by facilitating more or less the total changes in health and by increasing more or less the risks of chronicity (mainly regarding MSDs). These different health problems do not necessarily eliminate the ability to work but they are associated with a higher probability of an early departure from the labor market.

Conversely, well-adapted working conditions and work organization can have a protective effect against certain deteriorations in health. The results of the ESTEV survey suggest that a high autonomy in one's work and having time, information and material means available for good quality work are protective factors.

Each salaried employee is not a passive spectator of the more or less good fit between his functional state and the characteristics of his task. He develops compromises between the production objectives, his skills, and a concern about remaining healthy. These compromises are not stable. He is constantly reorganizing them, taking into account the technical changes, the changes in the organization, and his changing age. More or less consciously, he develops avoidance strategies for the causes of pain or difficulty, and compensation strategies in order to be able to perform a task despite some deficiency. In these strategies, professional experience plays a considerable role (Cloutier et al., 1999; Gaudart and Weill-Fassina, 1999), and it combines with experience about oneself, meaning the knowledge that the salaried employee acquires little by little about the aspects of the work that will be difficult or arduous for him. These compensations (anticipation, verification, cooperation, etc.) become established only if the work organization allows or even promotes them. The question raised is therefore that of compatibility between the work requirements and the margins of maneuver that individuals and groups have at their disposal to take into account these requirements and to develop their strategies.

These remarks also apply when a work situation is of no interest but a change in situation is: new product or service, new technique, change in organization, professional mobility, different types of job rotation or versatility. In this field, older salaried employees do not benefit from a favorable assumption (whose effect is mainly less access to training). Changes can in fact cause or reveal outdated knowledge and know-how in the oldest employees (Marquié and Baracat, 1995). But these difficulties can be lessened if the diversity between individuals at the time of the change is considered (their age, career paths, their plans), and if an attempt is made to extend the margins of maneuver in the change itself (Teiger, 1990).

The relationships between work organization and the workforce's characteristics, particularly age-related characteristics, are often stated in terms of the adaptation of salaried employees to requirements established outside of them (Pueyo, 1999): requirements to comply with standards, flexibility, delegation of responsibility, etc. The underlying idea is therefore that the system is efficient if the salaried employees suitably "fulfill" these requirements. In the following pages, we will instead look at the organization (from the standpoint of some of its main aspects), and its somewhat greater or lesser ability to make room for salaried employees of all ages. Underlying these aspects are the main issues that aging personnel already have to deal with, and that those people who will replace them will soon have to face: versatility and varied tasks, time pressures, work schedules, the collective aspects of work, learning and professional training, as well as job insecurity. We will cover each of these crucial aspects in work organization for aging personnel by addressing the issues that they raise, their effects on health, their possible exclusion mechanisms, as well as the management methods and margins of maneuver that are associated with them.

Versatility and varied tasks

Issues

The development of flexible types of organization increases the frequency of situations in which the same salaried employee must perform several different tasks, and even occupy several workstations during a period of a few weeks, a few days or a few hours. According to the national surveys on working conditions and work organization in France, the proportion of salaried employees stating that they “change workstation according to the company’s needs” increased from 17.5% in 1987 to 23% in 1998, and the percentage of those who had to change workstation through “regular rotation” increased from 4% to 6.5%.

Aging salaried employees have the reputation of having specific difficulties when the work changes. Their assumed “lack of adaptability” is furthermore the main negative assessment that employers make about them (Le Minez, 1995). These representations by employers should be carefully examined, but they often converge with the preferences of aging salaried employees themselves for a relatively stable work environment (Marquié and Baracat, 1995).

Effects on health

Versatility and varied tasks could have beneficial effects on health status and aging for at least two reasons. The first is that in the case of physically demanding work, task rotation limits the repeated solicitation of the same body segment, the same muscle or the same joint. Having as much variation as possible in movements and postures may exert a preventive effect on the accelerated wear and tear of certain jobs. The second reason involves repetitive and poorly qualified work (often the same as the one just mentioned). Long-term repetition of a limited series of operations is not very conducive to the development of skills, beyond the very specific ones that the task requires. A sufficient diversity of tasks may be welcome in order to avoid forms of “cognitive sclerosis” whose harmful effects, in cognitive skills as well as for the complete personality, have been described in studies on “low levels of qualification”, and particularly for the oldest workers among them (Grossin, 1980). These effects are all the more formidable because they compromise learning (when the latter eventually becomes necessary) and hinder the development of personal and professional plans.

However, aging salaried employees sometimes fear, and if possible avoid, versatility and task diversification. First level supervisors therefore attempt to spare them from this “ordeal”. One very simple reason may be that the other tasks are perceived, sometimes justifiably, as more difficult than those that they are already doing. It is reasonable to state that the more variation there is in the work situations and workstations, the greater the risk of having to deal with difficulty factors—particularly for aging salaried employees whose previous schedule allowed them to avoid this difficulty as much as possible.

More precisely, the random nature of the transfer of skills from one situation to another is emphasized. The example of sensorimotor skills, precisely studied by Gaudart (1996) on an automobile assembly line, is revealing and corresponds to a common situation. The author shows that “economic” strategies in terms of time or energy savings for aging (and experienced) salaried employees are often based on an increased use of skills, specific postural stabilization methods, and tactile controls instead of visual controls (which would require bending, for example), etc. These skills, as well as those that can be accumulated for the work’s cognitive components, “work well” for a given task. The salaried employee is uncertain about being able to use them in a different situation (David and Bigaouette, 1989), even if the difference seems moderate at first. If he is successful or if he manages to develop new strategies of the same type in the new situation, the period necessary for mastering the new requirements will perhaps be painful, with its share of fatigue and worry.

Added to this are the types of apprehension specific to the learning situation itself (see below), and the more conative-psychoaffective and motivational dimensions of this apprehension.

Possible exclusion mechanisms

It is said that with age, versatility and task diversification could have opposite effects on health. In terms of exclusion or weakening of the status of the older workers in the company, these two aspects are found.

Even though little research has been done on this question, we will first discuss the fragilizing mechanisms that are at work in those who “play the game” of versatility (in a more or less voluntary or willing way). Considering the difficulties mentioned above, this participation in less stable methods of organization may be costly in terms of health (David and Bigaouette, 1989; Gaudart and Pondaven, 1998), fatigue, and disappointments following failures. We know (as the ESTEV survey in France has clearly shown – see Saurel-Cubizolles et al., 2000) that “minor health problems” generally have a strong statistical relationship to the risk of job loss in the years that follow.

The other aspect is better known: at all levels (national surveys, sectors, company, shops, etc.), versatility—in any case, actually performed versatility—decreases with age (Molinié et al., 1996). In a period in which the dominant direction is flexibility in production facilities and in which the workforce is aging at the same time, this observation is a cause for concern because it reinforces the stereotype of less adaptable elderly people. This overall preoccupation varies individually: in a period of staff reductions, supervisors will be tempted to retain the most available salaried employees to handle several jobs or to carry out multiple tasks. In some cases, the “single skill” of an older person corresponds to a high level of specific expertise, but then the question asked is whether the position that he holds or the tasks that he carries out are permanent.

The two fragilization factors sometimes merge over time. For example, in analyzing the previous career paths of aging office workers, some of them are seen to be versatile former blue collar workers who have suffered wear and tear or have been injured for reasons involving this versatility. In their new jobs, their combined age, lack of experience, and poorer health exposes them to the risk of job loss or (if job security is ensured) to a marginal position in the working community.

Management methods and margins of maneuver

Considering the above, it could be tempting to propose moderation in the general trend to increased versatility, so that aging workers can keep their place in the company. In some cases, a careful analysis of the situation would undoubtedly challenge the validity of total-versatility. But this analysis is not simple; it involves diverse fields of knowledge including the management sciences. It is not certain that in the end, the company would benefit by limiting versatility, and even less that it would be of a type to convince the decision-makers. Therefore, the most promising margin of action is instead on the side of social control of the types of versatility and how quickly this versatility is implemented.

In brief, what will penalize older salaried employees—and all salaried employees, for that matter—is versatility in the urgency or the pressure to implement numerical flexibility. If the conditions are created for a gradual exploration of new tasks, by successive neighborhoods, with the necessary support in the informal working groups, and also with the possibility of trying and refusing without detriment when it is too difficult, there is every likelihood that the difficulties of the older employees will gradually disappear and that, on the contrary, the benefits of their experience will be valued.

This concern about controlling the ways that versatility is implemented can take very concrete

forms: small task-rotation modules, sufficiently flexible time periods during transitions; elucidation and recognition of the skills effectively developed for each task, etc. The prevailing idea is then that a too willing and too hasty pursuit of flexibility can in the end prove to be a rigidity factor in the actual functioning of shops and services. In this area as in many others, older workers can play a revealing role.

Work schedules

Issues

The result of work changes to increase functional flexibility is that companies in different economic activity sectors are using unusual schedules more and more. Schedules can be different for the same number of hours of work per week. Right now in North America, 20 to 25% of salaried employees work during non-standard working hours (Tremblay, 1997; Presser, 2000; Shields, 2000; Statistics Canada, 2000): weekend, evening or night work, shift work, on-call work, overtime work, extended shifts (up to 12 hours or more) and compressed workweeks, variable schedules on short notice, split schedules, etc. This proportion is constantly growing. In France, the national survey on working conditions shows that despite the reduction in weekly work hours, schedules are evolving towards a greater diversity of daily and weekly time segments, an increase in night and weekend work, and an increase in occasional work (Bué and Rougerie, 1998; French government, ministère de l'Emploi et de la solidarité, 1999).

How do relatively old workers react to this type of labor constraint that never occurs alone in the workplace? This is not an insignificant issue, given the increase in the proportion of the workforce 45 years of age or older, both in Québec and in France. Since the gender division of labor is reflected in the schedules, there is also a need to question whether there are differences between aging men and women in relation to this particular aspect. Furthermore, with the increase in the number of jobs in the services and health care sectors, interest in this particular issue is necessary and pertinent since salaried employees with a precarious status are a majority in these sectors and the people involved often have to work at all kinds of hours.

Effects on health

Several studies have shown the effect of some non-standard schedules on the health of aging individuals (Bourget-Devouassoux and Volkoff, 1991; Härmä et al., 1994; Quéinnec et al., 1995; De Zwart and Meijman, 1996; Brugère et al., 1997; Derriennic et al., 1999; Härmä and Ilmarinen, 1999). They report, for example, that with age and duration of exposure, capacities for chronophysiologic adjustment to shift work decrease; aging shift workers show an increasingly reduced tolerance for night work and shift rotation, as well as an increase in health and sleep problems, as early as their thirties. These effects are diversified; the main ones observed are fatigue and sleep disturbance problems, reduced vigilance, an increase in digestive and cardiovascular problems, and negative effects in the psycho-emotional sphere (changes in mood, stress, etc.). On average, some of these health problems are already difficult to reverse after five years of shift work. Aging and non-standard working hours therefore combine their negative effects, and only a small percentage of workers are able to maintain this type of schedule to an advanced age without affecting their health. Some individuals, however, are able to remain at work with these specific schedules at an adaptation cost acceptable to themselves and their families. They report relatively few problems and say that they are satisfied with the schedule. For job security and satisfaction, several studies show little or no difference between old and young workers.

Furthermore, several studies have shown an increase in accident and incident frequency during the night (Folkard and Monk, 1985; Quéinnec et al., 1992). However, a recent study indicates that in Québec refineries, the most accidents and the most serious accidents occur during the day, when the operators are diverted from their regular monitoring and control tasks in order to

perform related tasks required by and for the technical day personnel; these accidents occur mainly on sites with the fewest and least versatile operators (Bourdouxhe et al., 1997). This illustrates convincingly that the relationship between age, schedule and health cannot be separated from the work activity and context.

Potential exclusion mechanisms

Non-standard schedules are very demanding for personnel who continue to do them, even if these workers are the survivors of a selection process that is based on health in particular. Some studies (Bourget-Devouassoux and Volkoff, 1991; Derriennic et al., 1996) have in fact shown that health problems are more visible in former shift workers who have taken a regular day job. On average, they have more illnesses than workers who still work shifts and those who never have. The study by Bourdouxhe et al. (1997) clearly shows that the increase in the number of illnesses with age, although expected for everyone, is particularly significant for former shift workers in the refinery. Interest in the career development of employees is therefore pertinent because they accumulate traces of their work history.

Management methods and margins of maneuver

Other factors in work organization can play a very important role in work schedule organization and allow a margin of maneuver to emerge for aging personnel. This is all the more important because schedules are not the only difficulty associated with the work activity; accumulated simultaneous work constraints penalize older workers the most. Hence, work schedule organization cannot be separated from the task to be performed. According to Bourdouxhe et al. (1999), even if “there is no good schedule or good solution or a single solution suitable for everyone”, there are, however, basic principles for management to follow in order to protect workers of all ages and particularly older workers:

- Plan for 12 to 16 hours of rest between two successive shifts;
- Allow one or two days of rest before a rotation in shift;
- Avoid extended shifts in activities that require sustained vigilance or intense physical effort;
- Reduce the use of overtime as much as possible;
- Allow time-for-time exchanges during negotiations: if the worker gives his time, he must receive time in exchange, rather than monetary compensation;
- Take into account the work team’s characteristics, particularly the ages of the members;
- Take into account the actual work (nature of the tasks, constraints, variations, etc.);
- Introduce flexibility and variety into the chosen solutions;
- Remember that a solution with advantages will undoubtedly also have disadvantages.

With the work changes that are occurring, work organizers tend to limit staff and their renewal as much as possible and to eliminate the possibilities of reclassification to day jobs for “worn out” or aging workers, thus preventing reassignment from playing its protective role for these workers. To avoid their exclusion, male and female workers must be given the choice of reassignment to other jobs or they must be offered reorganized schedules and tasks in order to eliminate the constraints that they can no longer handle as they age. This would be achieved by a personnel planning policy that takes into account the age structure of personnel.

Time constraints

Issues

Among the macroscopic changes occurring in work, the use of new forms of work management and organization, which affect the actual work activity, is well known. As examples, we should mention in particular: participatory management, semi-autonomous teams, quality management, just-in-time production and the pursuit of flexibility by companies. All of these new types of

organization, related to the increase in time constraints and work pace imposed by the production process, frequently result in an intensification of the work. For a few years, the data from the French surveys on working conditions have been showing an intensification in the work, with one of its signs being increased time constraints (Molinié and Volkoff, 1995). This work intensification also involves the tertiary sector whose workforce is increasingly subjected to major time constraints (Gollac and Volkoff, 1996, 2000; Molinié and Volkoff, 2000). Finally, these same surveys show that work under strong time pressure particularly involves women; these constraints are more common in sectors where women represent a large proportion of the workforce.

Time constraints are rarely the only difficulties present in the work environment. They are frequently paired with other difficult working conditions: carrying heavy loads or awkward postures. How does an older workforce react to this accumulation of work difficulty factors added to time constraints? With advancing age, is people's health more sensitive to time pressure?

Effects on health

Several studies have shown an increase in musculoskeletal disorders in relation to seniority and not age, thus allowing the hypothesis of a wear-and-tear phenomenon related to work intensity, and therefore to time constraints, regardless of age (Bellemare et al., 1998; de Zwart, 1997). A recent statistical survey on the health of personnel of the *Agence nationale pour l'emploi* in France reveals certain effects of work intensification caused by time constraints in this service sector (Molinié and Volkoff, 2000). The authors observed relationships between time pressure and the relatively high prevalence of what they call "minor" health problems such as joint pain, sleep problems and a nervous feeling. Average prevalences of important problems such as limitations in movement, the consumption of medication or work stoppage for a long-term illness are also associated with these time constraints.

High time pressures can penalize older female and male workers if they prevent these workers from using protective strategies developed through their work experience. To achieve the same production objectives, the oldest and most experienced workers may work differently from young workers; in fact, through experience, they develop individual and collective work strategies that allow them to continue to do quality work efficiently, while protecting them from risks (Avila-Assunção, mass catering, 1998; Cloutier, domestic trash collectors, 1994; Cloutier et al., home care and social service workers and nurses, 1998; Gaudart and Laville, automobile industry, 1995; Millanvoye and Colombel, aeronautics construction industry, 1996; Pueyo, iron metallurgy, 1998).

Subjecting an older workforce to strict time pressures may contribute to the appearance of certain types of occupational injuries and health problems as well as to fatigue and stress. Time constraints may also help bring out health problems that would not have appeared in another work context more in keeping with the worker's personal work pace. Derriennic et al. (1996) noted that the consumption of psychotropic drugs increases with age in individuals subjected to high time pressures.

Possible exclusion mechanisms

In addition to causing health problems, time constraints may result in exclusion from work if the compensatory strategies that the individuals implement to minimize them cannot be used. This exclusion effect becomes more prevalent as the population ages. In trash collectors, it was surprising to note that they are not injured more than they are, given the many risks that they face in their profession. Selection and the consequent "healthy worker effect" partly explain the phenomenon. These considerations have an impact on the means of prevention arising from work organization. Why, for example, would anyone want to continually dismantle work teams that work well, when safety depends directly on collective work practices?

Management methods and margins of maneuver

Changes in work organization may help reduce time constraints, which is beneficial for everyone but even more so for older workers. For example, in the case of trash collectors, the oldest workers can work at a different pace than their young colleagues because work organization allows them to do so. Trash collectors explain that adjustment of the work pace depends on their knowledge of their partner, the truck and the collection territory. Work organization gives trash collectors some leeway in the length of their workday, thus allowing them to adjust their work pace to their capacity and thus control their activity. Finally, when work organization respects the stability of work teams, it allows cooperative work by the driver-trash collector pair. It is therefore based on the collective knowledge that has developed (Cloutier, 1994).

In the health care sector, the work often consists of interacting with a person who is in pain, which introduces a particular aspect into the work activity and a dimension of co-activity between the worker and the patients. A recent study in the home care sector on home-care and social-service workers (nurses' aides) also revealed the prevalent concern about time (Cloutier et al., 1999). It also documented time management strategies in relation to the requirements of the three poles that structure their actual activity: the patient and her immediate environment which constitute the "subject" of the work (quality of care, empathy); organization (productivity, efficiency, social mission); and the worker herself (being proud of her work, protecting herself from risks, and being able to continue to work).

Task observation and analysis of the dialogue revealed the strategies that the home-care and social-service workers develop to attempt to reconcile the contradictory instructions that originate from these three poles. Here again, as in other sectors, certain constraints originating from management oppose these strategies. For example, while the home-care and social-service workers demand as much stability as possible in their cases (because of the time they can save when they know their patients and environment well), the managers base the distribution of cases on other principles such as equity and diversity. Other organizational planning, such as improving the flow of information and the systematic application of procedures, would help lighten the load of home-care and social-service workers as well as that of other professionals on the health care team.

In terms of management, there is good reason to believe that the development of certain organizational factors provides a positive margin of maneuver by reducing time constraints, thus allowing older personnel to use the protective work strategies that they have developed through experience.

Collective work aspects

Issues

The evolution of organizations has contradictory aspects in collective work activities (Magaud and Sugita, 1993). Without a doubt, the will of managers has never been as strongly affirmed, in the management literature as in company communications: giving priority to cooperation, to team spirit, to a well-regulated synchronism between the workers' initiatives. Also, the objective characteristics of work organization and workforce management have never introduced as many obstacles into these collective operations: the number of isolated workstations is growing; the increase in emergencies has each person focusing on his individual priorities; the frequent changes in objectives and means of production destabilize the groups; the intermittent presence of salaried employees with diversified and temporary statuses introduces different types of co-activities.

Demographic evolution influences the composition of groups. Many companies have a narrowed age structure in which there are few young people (low levels of recruitment in the 1980's-1990's)

and also sometimes few older people (former cohorts, marked by early departures). Diversity in the work teams' experiences and resources is then more difficult to construct and preserve.

Effects on health

Task sharing, mutual assistance, and consistency in their actions are among the resources that salaried employees use to reconcile their work requirements with staying healthy. This is true at any age, but aging salaried employees pay particular attention to this aspect because they have learned from experience the importance of these collective components of the activity. They have also developed along their career paths a particular type of competency in the construction and use of the collective dimension (CREAPT, 1998).

Epidemiology confirms the idea that successful cooperation is protection against professional wear and tear. The positive effects of social support, often demonstrated in the literature, apply in part to this idea. Conversely, insufficient cooperation or mutual assistance is associated with an increased incidence of health problems, in both interprofessional statistics and company surveys. More directly, failure in the functioning of groups may appear in the occupational accident fault tree, this time with a specific impact on young salaried employees, and particularly those with temporary contracts (Huez, 1996), who are less familiar with the operation of the machines or installations, and less informed about the work rules in the shop or on the work site where they work (Frigul and Thébaud-Mony, 2000).

An obvious form of collective management of the relationships between age, health and work is the more or less formal distribution of tasks between salaried employees of different ages. On airplane assembly line sections, where all the workers know how to perform each operation and no sharing of tasks is required, the oldest workers are in fact "protected" from the most difficult postural requirements and phases of possible sudden acceleration of the work pace. They preferably perform tasks in which their work pace and actions can be organized more autonomously with know-how being a major aspect (Millanvoye and Colombel, 1996).

In a study on the prevention and management of musculoskeletal disorders in a company restaurant, Avila-Assunção and Laville (1996) noted that for tasks with physical requirements, all the workers were helped by their coworkers. However, a young person without MSDs will help, for example, in lifting a pot full of beans, to pour its contents into a mixer. An older person with an MSD will wait for two coworkers to come and carry out this task. Other tasks (or sometimes the same ones) require specific knowledge of the culinary arts, and know-how acquired through practice. Experienced female workers over age 35, many with MSDs, are seen becoming involved at their coworkers' workstations to improve the preparation quality of the dishes, while young novices never carry out such actions. In all these cases, help is given spontaneously, without being requested in a perceptible way, as though the work group has acquired both the concept of when help is needed and the concept of what types of help are adapted to each coworker.

Methods of collaboration were also observed among aging personnel. The home-care and social-service workers who work alone in their patients' homes feel they need to get together on a daily basis to share the difficulties and the tricks of their profession. Due to a lack of meeting time planned by their employer, they eat together at noon (Cloutier et al., 1999). Analysis of the strategies of construction and use of the group by experienced salaried employees also shows that an older age is often accompanied by increased use of verbal exchanges to maintain a high level of information within the group, to ensure that they have all the necessary information, and to contribute to a culture of solidarity and togetherness. These communication strategies intersect with time-pressure management methods: communication helps in developing anticipatory attitudes and thus avoids emergency situations, which are costly to manage. It also helps in each person's programming of coaction or cooperation over time. This is shown mainly by the analysis of the communication methods of workers controlling the output from a rolling mill,

conducted by Pueyo (2001): the older workers have a broader network of relationships than the young workers and act as pivotal people in the work group. The older workers are both the resources for the group and rely on it to obtain information or carry out actions on the system through delegation and coordination. They build the network and make it reliable by supplying it with information, and negotiate with the hierarchy and technicians by departing from their prescribed roles.

However, an ambivalence can be seen, because the older workers are also those who sometimes seek forms of solitude and individual autonomy (Volkoff, 1998). In some situations, they take advantage of their isolation to develop very personalized operating methods. Instead of there being an increased need for cooperation with age, there is emphasis on an increased desire to choose the degree and types of cooperation that will be available (based on the tasks and times). The study on trash collectors shows that the oldest choose to work at a pace different from their younger coworkers. They explain that this possibility of adjusting their pace depends on such things as knowledge about their partner; this team stability allows the trash collector-driver pair to work cooperatively (Cloutier, 1994).

Possible exclusion mechanisms

Task sharing on the one hand, and cooperation on the other, do not refer to the same issues in terms of weakening of status and jobs with age. Task sharing within a work unit originates from mechanisms that have been more broadly analyzed by occupational demographics (Volkoff and Molinié, 1995): the collective regulation of constraints by selection based on age. This is an effective means of relieving the oldest workers, for example in relation to the most difficult efforts or the costly management of emergency situations. But this solution is viable (at a cost of increased difficulties for young workers, and therefore a risk of early wear and tear on them) only if the demographic structure is appropriate, which is the case less and less often. In the already-mentioned study on airplane assembly (Millanvoye and Colombel, 1996), the young people hired (with more diplomas and supposedly more familiar with recent techniques) are directed towards the most automated workstations; salaried employees 35-40 years of age then play the role of "young people" in the rest of the company and must bear, not without risk, a significant share of the difficult work. Elsewhere, the hiring freeze and subcontracting in manual labor have forced aging workers in a large municipality into positions normally assigned to young people (David and Bigaouette, 1989).

The question of cooperation is at first glance less problematic. In general, the development of collective margins of maneuver is an important way of preventing exclusion for the reasons already stated: the possibility of promoting collective deficiency-compensation and anticipation strategies (Cloutier et al. 1998). This beneficial effect of group work is limited by the control methods applied to the group's productive performances. If the appreciation by the hierarchy, compensation, and even the job security of a team's members depend directly on its production volume per head, someone's weaknesses, even though they may be temporary, may lead to negative reactions in the group itself. Aging salaried employees may then be among those that the team no longer wants, or even those that no team wants to include. This exclusion by the group is without a doubt one of the most formidable exclusions. Its possible outcome will be early voluntary separation, if the opportunity arises.

Management methods and margins of maneuver

Regarding action orientations, there is the contradiction initially raised: collective regulations in work are often mentioned and little known or, which comes to the same thing, not well recognized. Paying sufficient attention to this aspect is the only way that these collective components of the activity can be recognized and promoted, while establishing favorable conditions: organization of space, discussion time, flow of information, etc.

When considering experience in particular, three favorable aspects can be highlighted: work groups that are sufficiently diversified in composition in order to find complementary skills and pass them on; a relative stability of these groups so that collective types of experience (and mainly a good representation by each member of the others' experiences and skills) can be developed; and leeway be left (or even organized) so that a common professional culture develops, mainly with sufficient agreement on the work objectives and rules.

Learning and professional training

Issues

“Learning, is it a skill reserved for the young?” asked Paumès and Pélegrin (1993) somewhat justifiably. Statistics on continuing education in relation to age show the large difference between young and old salaried employees in the amount of continuing education (Aventur, 1994). Obviously, the situation varies from one company to another and over time. But in most cases, employers, managers and employees seem to agree that beyond a certain age, training efforts are very likely to be costly and not very profitable (Jolivet, 1999).

The literature on industrial psychology provides explanations on the sometimes-painful learning situations of the elderly (Paumès and Marquié, 1995). Mentioned in particular are fears about employment, concern about damaging equipment, and apprehension about competition with the younger workers. The difficulties related to the change itself, to the characteristics of the new work situation, and to training, combine and grow: for example, in the surveys on this subject, we see that the frequency of responses regarding “the lack of time to become familiar with the technological change”, “difficulty understanding the new terminology”, “difficulty making sense of the operating manuals” or “stress due to skills that are not adapted to the new technique” increased with age (Hukki and Seppala, 1992). The idea of avoiding failures is also what determines the selection policies of the company directors, who are also careful about achieving good “profitability” from the training efforts, which is more difficult if the salaried employee has only a few years of work in front of him.

Because of the rapid changes affecting occupational situations, no one will now be able to do the same job his entire life using the same work methods or techniques. More and more salaried employees will, at one time or another and possibly even several times in their careers, engage in professional training processes (Carnoy, 2000). Since the workforce is aging, this concern will also involve older workers.

Effects on health

Advancing age can be accompanied by an involution of performances in some basic cognitive functions. This involution is perceptible in relation to demands on short-term memory, for example, demands that can be significant in a learning situation. The effect of this involution may also be a slowing of the selection of information or in decision-making, due to diminished performance of the sensory organs, or possibly a slowing of the processing of information by the brain, or even a strategy of caution and verification often shown by the elderly (Marquié, 1995).

For working life as a whole, these differences between ages are small. They are accompanied by a large interindividual diversity because in each type of test, a large proportion of the oldest workers obtains results comparable to the average of the youngest. Performances depend greatly on initial training, and the differences therefore reflect an important generational effect, with the elderly generally having had less education. Also, the role of continuing education is considerable: regular training is particularly profitable for older workers. Learning difficulties, and the health problems that can ensue—particularly the states of anxiety directly related to the training situation itself (Delgoulet, 2000)—therefore do not have a fixed neuropsychological basis.

Furthermore, the results of the comparisons done in test situations are not transposable, as is, to the work context. There is a need to differentiate, on the one hand, basic information-processing skills (which are very dependent on functional state and therefore likely to decline with age) from, on the other hand, the knowledge that has developed from former processing structures and whose role will be decisive, provided that a sufficient “familiarity” with the new task can be established—with age and experience thus appearing as assets. The anxiety already mentioned, the learning difficulties, and the feeling of “loss of control” over the situation are thus intimately linked, particularly in the first days, and even the first hours of learning.

For all these reasons, it is not surprising to note, based on the results of statistical surveys, that training that is considered as well adapted by salaried employees is associated with lower prevalences of health problems—or, conversely, that training considered as inadequate is accompanied by accentuated problems—and in a more marked way with increasing age (Molinié and Volkoff, 2000).

Possible exclusion mechanisms

If the aim of training is to develop personal knowledge, at first without a direct link to the actual or future work, the fact of refusing or failing in this learning has no direct consequences on the job or on qualification. However, this refusal or failure has the effect of contributing to the negative representations about learning capacity by the salaried employees involved as well as the management and instructors. If aging salaried employees are involved, this representation is rapidly associated with characteristics that are supposedly intrinsically related to age.

The issue is more immediate if it is a question of professional training at the workstation or of learning a new task. Refusal or failure often amount to a progressive marginalization (Teiger, 1990). This is associated with remaining in tasks where training was not essential, but possibly tasks that require less qualified people and/or are destined to disappear. This situation is of special concern for salaried employees who are no longer young (considering the already-mentioned reinforcement of stereotypes), but who are also not close to retirement and will therefore possibly have to remain, until they stop working, in this situation with a lower status (with probable consequences, although not extensively studied, on health status after the end of their working life).

However, we should mention paradoxical situations in which salaried employees, and particularly older ones, believe that it is to their benefit not to be trained, and even not to succeed in it. In fact, in some companies these refusals and failures are considered as having no impact on job security, while success in training may be accompanied by a better status in principle, but with new constraints (geographic mobility, anxiety-producing responsibilities, rather unfamiliar work content, etc.) which older salaried employees prefer to avoid.

Management methods and margins of maneuver

The concerns that have just been mentioned characterize the conditions for a good learning process in aging salaried employees (Teiger, 1990; Paumès and Laville, 1995) :

- a clear statement of the objectives of the training and its expected impacts on working life;
- a duration and schedule for training in which memorization, understanding, and adjustment to previous knowledge can be combined (and a possible “unlearning” of some of this knowledge), and the outlook for the future work activity;
- the gradual and regular nature of the training processes, allowing everyone to resume the learning habit and to maintain the corresponding aptitudes;
- a program content that takes into account to a large extent previous career paths, by multiplying the concrete examples associated with an effective professional practice;
- teaching methods that promote expression of hesitations or questions, that offer

opportunities for collaboration and that allow the acquired knowledge to be applied in a reassuring context (and hence the interest in the training carried out at the workstation itself);

- vigilance concerning the return-to-work period after training, so that the acquired knowledge can be used as soon as possible, with the necessary support in the event of difficulties.

When training is considered in a context in which a significant proportion of the workforce is older and experienced, one's first thought is about ensuring the most effective training possible for this workforce by taking into account its specific characteristics. Another equally rich aspect to explore has to do with the use of this experienced and very competent workforce to train future workers. In other words, what are the most appropriate conditions for passing on know-how and skills that have accumulated through experience?

These questions are new, and very few studies have been carried out on this subject in actual work situations (Cloutier et al. 1999; Cloutier et al., 2000). However, several studies show the important knowledge gained through experience in terms of occupational health and safety as well efficiency and quality; these possibilities cannot be ignored. There are clearly many very important issues on this subject. Several models could be explored, namely coaching, tutorship or support in an actual work situation.

Precarious employment

Issues

Job insecurity is an important issue for the older workforce; however, it does not have the same importance as other issues. In fact, precarious employment relating to the workers' conditions of employment and its consequences on the work activity are less directly perceptible.

Because companies are concerned about economic rationalization and maximum numerical flexibility, they are increasingly favoring precarious employment. Precarious employment related to employment status is expressed directly by fixed-term contracts and the hiring of consultants, and indirectly, through subcontracting. Furthermore, companies also favor another type of precarious employment involving the layoff or underemployment of certain groups of workers (Thébaud-Mony, 1993). This form of precarious employment particularly affects women, young people and older personnel, as Québec and French statistics indicate (Gollac and Volkoff, 2000; Monthly workforce survey, ministère du Travail du Québec, 1996-1998; Canadian census). Aging personnel can be disregarded in different ways such as temporary assignments, the creation of special jobs, early retirement, part-time work, or unemployment for reasons of unsuitability.

Consequences on personnel

Precarious employment results in unequal working conditions in companies between different groups of salaried employees. Normally, recently hired younger employees have a precarious status, while older employees who have been working longer have the regular jobs. Very often, these groups with different employment statuses do similar work. However, precarious employment job insecurity helps make it more difficult for everyone to carry out the work activity. Training and information are provided less often to people who do not have a regular status; the unconsidered lack of familiarity with the tasks to be performed may lead to an increase in the time constraints experienced by all workers.

Despite the apparent advantage of aging female and male workers, the difficult conditions that those with insecure jobs must endure to carry out their tasks also have an impact on the work of generally older regular personnel, because of the disorganization that they may cause (Huez, 1996). In fact, these regular employees often have to compensate for the gaps resulting from the new work organization, which attempts to reduce all work time to "productive" time, thus

increasing their own workload and lost time. This also occurs in a context in which insecurity may help to reduce the possibilities of collaboration and mutual assistance in the work team and even promote conflicts (Beaud and Pialoux, 1999) because these new practices accentuate the difference between recently hired personnel and those who have more seniority regarding salary level and job stability (Kumar, 2000). Older workers also feel threatened by the risk of job insecurity.

For the aging workforce, other consequences related to job insecurity can also be seen. In fact, companies' pursuit of numerical flexibility increasingly reduces the number of regular jobs and eliminates the lighter jobs (David and Bigaouette, 1989). This increases the insecurity of aging personnel, since it is more difficult to find a job at an advanced age (Canadian census).

Precarious employment is also an increasingly prevalent reality in the service and health care sectors, which employ many women. In fact, for twenty years now in the service and health care sectors, the use of on-call, fixed-term or subcontracting jobs has had an impact on maintenance jobs and material support jobs. Specialized jobs such as those of nurses could be assumed to be protected from this new trend. But this is not the case. We are therefore seeing situations in which personnel with different statuses and often of different ages do the same work. The repercussions of this reality on occupational health and safety are not extensively documented and even less so in a context of aging of the workforce.

Effects on health and possible exclusion mechanisms

Research in different sectors such as forestry and the nuclear industry has shown that the consequences of subcontracting on employees include an increased workload, a process of dequalification, a deterioration in working conditions, and exclusion of workers considered unsuitable for the work due to illness or accident. These studies have also demonstrated the unequal risks of occupational injuries based on status (François, 1993; François and Liévin, 1993; Thébaud-Mony, 1993).

Occupational health physicians have observed in France that precarious employment, because it fragments career paths and reduces social support and margins of maneuver, increases the negative physical and psychosomatic as well as psychic effects on health (Huez, 1996). Also, precarious employment eliminates from the company all traces of wear and tear due to the work because it reinforces the mechanisms of selection/exclusion from the labor market based on age and health criteria. In this context, Thébaud-Mony (1993) as well as David et al. (to be published) comment that in both large and small companies, prevention strategies are replaced by the transfer of certain occupational risks from stable groups to workers with precarious jobs.

Management methods and margins of maneuver

Can companies' concern about flexibility, which is achieved through the increasingly massive use of personnel with precarious status, coexist with respect for the integrity of older personnel? It can, on condition that managers and work organizers recognize the specific nature and richness of the know-how of the experienced workforce. In fact, with this recognition, means of organizing individuals' work can be developed, while taking advantage of the richness of their knowledge and offering them relative stability. Some flexibility in types of employment could be an advantage for older personnel who want to start planning their life in retirement. This is already being done in some milieus by making part-time work and gradual retirement available.

CONCLUSION

For work situations to allow aging personnel to continue to work, a preventive perspective needs to be developed. It will have to take into account the fact that the difficulties revealed for "problems" experienced by aging personnel also exist for the entire workforce. As underlined by

Teiger (1995), it is a reality principle because people change with age, not only through losses, but also with knowledge. Changes in work, which were described at the start of this paper, also occur in a context in which the difference between chronological age and functional age is increasing. It is for this reason among others, that in the coming decades, as the population ages faster, the major issue of aging of the workforce will have more to do with the conditions for keeping aging personnel employed than with lowering the retirement age.

The complexity of these issues and the few data and analyses on them introduce more questions than they answer. Consequently, as a conclusion, we propose a series of questions for reflection that can help orient the programming of future work:

- Aging and health in the workplace: descriptive knowledge

- What is known about the health status of active workers at different ages?
- What are the main aspects of interindividual variability?
- What are the differences between professions, sectors, statuses, regions, countries?
- What links are there to post-occupational health and mortality?

- Aging caused by organizational choices about the actual work activity

- What characteristics of these organizational choices have an impact on the evolution in functional state with age?
- What characteristics have an impact on physical health at the different stages in career paths?
- What characteristics have an impact on psychic health at the different stages in career paths?
- Are there factors that help to accelerate or slow certain declines?
- Are there factors favorable to the development of health as people age?
- Are there combined actions from several factors?

- Do work-related organizational choices tolerate aging?

- Which organizational choices introduce particular problems for aging personnel: difficulties, questioning of individual and collective work strategies, etc.?
- Which characteristics, on the contrary, give value to the assets of professional experience?

- What roles do experience and the intergenerational transmission of knowledge play?

- Under what conditions can knowledge and know-how based on practice be acquired and strengthened?
- How is experience developed over a career?
- How can accumulated experience be taken into consideration from the start of a career?
- Under what conditions can experience be used as protection against risks?>
- What are the methods for passing on know-how and skills between experienced personnel and novices?
- What conditions are favorable to the interactions necessary for this transmission?
- How can the positive aspects of advancing age, associated with experience and the construction of competencies, be determined?
- Is there a reason for integrating such transmission methods into the context of continuing professional training?

- How can this knowledge be taken into account to anticipate organizational choices related to the six main issues concerning aging of the workforce?

- versatility and varied tasks;

- schedules;
- time constraints in work;
- collective aspects of the work;
- learning, professional training;
- employment status.

- What methods of follow-up can be implemented in the area of relationships between age, health and organizational choices?

It is not certain that this reflection should be differentiated from the more general one that encompasses working conditions in the broader sense. In any case, the question raised is that of the epidemiological and demographic tools that can be developed, as well as their combined use with qualitative or clinical observations.

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¹In this paper, the concept of “work organization” will be used in a broad sense, referring to all of the company’s options in areas such as schedules, time constraints, technology, methods of task distribution between individuals and groups, methods of controlling the work activity, etc. This meaning, common in the approach to work situations in companies, does not favor any specific conceptual reference.

²The text that follows served a basis for discussion in the workshop on *Vieillesse, organisation du travail et santé (Aging, work and health)* which was held in the context of the second Franco-Québec seminar on aging and health. It took place in Montréal in July 2000. This text was not meant to be exhaustive in its remarks or in its references to the works on which it is based. Instead, its aim was to initiate discussions in order to develop fruitful collaboration between researchers. From this standpoint, it is structured around the main issues that we believe have to be given priority due to their importance in the issue of keeping aging personnel employed. For this work, the authors benefited from the financial support of the ministère des Relations internationales du Québec and the ministère des Affaires étrangères de France within the context of the program of the 58th session of the Commission permanente de coopération franco-québécoise.

³By comparing the professional structures of the G-7 countries from 1979-1990 to those from 1920 to 1970 analyzed by Singelman (1978), Castells concludes that the statistics confirm these different trends.

