FEVRIER 1975

LOIS NOUVELLES DE LA VIE PROFESSIONELLE

Loi sur la sécurité de l'emploi
Loi sur certaines mesures de promotion de l'emploi
Loi sur la situation du représentant syndical dans l'entreprise
Loi sur la procédure des litiges du travail

MINISTERE DU TRAVAIL
STOCKHOLM
SUEDE

Adresse Postale:
ARBETSMARKNADS-
DEPARTEMENTET
Fack
S-103 10 STOCKHOLM

FEVRIER 1975

LOIS NOUVELLES DE LA VIE PROFESSIONELLE

Loi sur la sécurité de l'emploi
Loi sur certaines mesures de promotion de l'emploi
Loi sur la situation du représentant syndical dans l'entreprise
Loi sur la procédure des litiges du travail

MINISTERE DU TRAVAIL
STOCKHOLM
SUEDE

Adresse Postale:
ARBETSMARKNADS-
DEPARTEMENTET
Fack
S-103 10 STOCKHOLM

Avant-propos

L'économie suédoise, depuis la fin de la guerre, a profondément évolué. Chefs d'entreprise et salariés ont bâti en commun une industrie efficace. L'accroissement des ressources de la collectivité a donné lieu à un accroissement de bien-être qui a bénéficié au plus grand nombre. Les revenus se sont élevés, les horaires de travail ont été raccourcis. Les ressources communes nous ont permis d'améliorer la sécurité sociale, l'éducation et la qualité de l'habitat pour toutes les catégories de la nation. Au niveau individuel, l'évolution s'est soldée par une plus grande sécurité et une liberté accrue.

Mais l'expansion industrielle n'a pas seulement eu pour effet d'asseoir le bien-être. Les rationalisations et la recherche de l'efficacité ont pressé les cadences et augmenté les contraintes qui pèsent sur les salariés. Nombreux sont ceux qui ont dû renoncer à la vie active par suite de mauvaises conditions de travail ou parce que les prestations demandées étaient trop élevées. Et le risque est grand pour les vieux, les handicapés et ceux qui manquent de formation de se trouver placés en marge du bien-être.

La valorisation des tâches et la sécurité de l'emploi sont des revendications qui, pour être satisfaites, supposent à la fois une action décisive de la collectivité et une participation active des salariés eux-mêmes. Ce qu'il faut chercher à obtenir, c'est une régénération de la vie du travail qui parte des conditions existant sur les lieux où il s'exerce.

Ces constatations, au cours des dernières années, ont inspiré les travaux de réformes effectués sur le marché suédois du travail. Une commission oeuvre actuellement aux changements que nécessite la législation de base du droit du travail pour que les salariés et leurs organisations bénéficient d'une position plus forte autour de la table de négociation et pour qu'ils puissent se faire entendre dans les questions relatives à la politique du personnel ainsi qu'à l'organisation et la conduite du travail. Dans les grandes et moyennes entreprises, les salariés ont déjà obtenu le droit de se faire représenter aux Conseils d'administration. Un vaste travail de réforme a été enga-

gé pour mettre sur pied une sécurité du travail pleinement satisfaisante et des milieux de travail de qualité. Les textes accordent aux salariés, par l'intermédiaire de leurs délégués, des possibilités nettement accrues de dire leur mot lors de la planification de nouveaux postes de travail. D'autres travaux législatifs sont en cours pour améliorer la position de ceux qui n'ont reçu qu'une instruction de courte durée et les aider à suivre une éducation d'adulte tout en bénéficiant à cet effet des congés nécessaires.

Non moins importante est la question de la politique suivie par l'entreprise en matière d'embauchage, de licenciements et de mises en chômage. La collectivité doit créer les garanties d'une protection efficace de tous les salariés contre les licenciements arbitraires et d'une influence des organisations de salariés sur les questions de personnel de manière à rompre la tendance à une mise hors circuit de plus en plus impitoyable des catégories les plus exposées.

Même si l'on renforce les garanties d'emploi de la manière indiquée, il est inévitable que les salariés continueront de courir le risque d'être licenciés en raison de changements survenus dans la production. On ne peut pas non plus négliger le risque qui consiste pour un employeur, vu le renforcement de la sécurité de l'emploi, à hésiter à employer des salariés pour lesquels la protection est particulièrement étendue. Il est donc nécessaire de combiner la garantie du maintien de l'emploi avec des mesures aptes à améliorer les possibilités de se faire employer de ceux qui ont des chances réduites sur le marché du travail ouvert. La loi sur les mesures de promotion de l'emploi établit les bases d'une telle collaboration entre services du marché du travail, organisations syndicales et employeurs.

Les exemples ainsi rapportés donnent une idée du rôle que les Pouvoirs publics tiennent à faire jouer aux organisations des salariés. Mais celles-ci doivent être en mesure de travailler aux solutions des problèmes de la vie du travail en partant de positions mieux affermies, davantage équivalentes. L'intérêt général commande par conséquent d'assurer aux représentants syndicaux la possibilité d'accomplir les tâches dont ils sont chargés. C'est l'objectif poursuivi par la Loi sur la situation des représentants syndicaux dans l'entreprise.

On ne peut exclure que la réglementation croissante des rapports de la vie du travail ne donne lieu à des conflits. Le maintien des dispositions procédurales anciennes aboutirait à faire juger des problèmes analogues par des tribunaux différents. L'adaptation en cours des rapports découlant de la Fonction publique aux règles en vigueur par ailleurs sur le marché du travail ne motive plus les différences existant au niveau de la fonction judiciaire. La nouvelle Loi sur la procédure des litiges du travail permettra une application homogène de la loi dans les conflits du travail. L'organisation judiciaire elle aussi est en cours de modification pour pouvoir répondre aux exigences posées par le travail de réforme, toutes les grandes organisations ayant maintenant la possibilité, devant la Cour du travail, d'influer sur la jurisprudence du marché du travail suédois.

Ingemund Bengtsson
Ministre du Travail

SOMMAIRE

P R E S E N T A T I O N G E N E R A L E D E S L O I S

Loi sur la sécurité de l'emploi

Cette loi s'applique en principe à tous les salariés des secteurs public et privé. Les exceptions concernent notamment les chefs d'entreprise et les membres de leur famille. Sont en outre prévues certaines dispositions divergentes, en premier lieu pour les fonctionnaires de l'Etat.

Sur certains points, les partenaires sociaux peuvent compléter ou remplacer la loi par des dispositions mieux adaptées à la branche en question. De nombreux accords de ce genre ont déjà été passés. Mais dans ses aspects essentiels, la loi revêt un caractère impératif.

Une des prescriptions fondamentales de la loi est que tout licenciement opéré par l'employeur doit être objectivement motivé. Si un différend s'élève sur la validité d'un licenciement, il pourra être soumis à l'arbitrage d'un tribunal. Le salarié a généralement droit au maintien dans son emploi jusqu'à ce que le différend soit tranché de manière définitive. En d'autres mots, la loi met un terme au principe en vigueur jusqu'ici qui permettait à l'employeur de rompre librement le contrat de travail.

La loi prévoit un délai-congé réciproque d'au moins un mois pour l'employeur et le salarié. Tout salarié ayant été employé pendant un certain temps minimum, s'il a au moins 25 ans, a droit à un préavis plus long. La durée de ce préavis va croissant avec l'âge, soit de deux à six mois. La durée maximum s'applique lorsque le salarié a 45 ans révolus. Mais les conventions collectives peuvent stipuler des préavis plus longs ou plus courts. Pendant la durée même du préavis, le salarié a droit en principe à son plein salaire. L'employeur a cependant le droit de déduire du salaire dû pendant le délai-congé ce que le salarié a gagné, ou ce qu'il aurait manifestement pu gagner ailleurs qu'au service de l'employeur.

Le salaire intégral est accordé en cas de mise en chômage dans la mesure où celle-ci a duré plus de deux semaines consécutives

ou encore un total de plus de 30 jours au cours d'une année civile. Un aspect important est celui des règles prévues par la loi pour l'ordre de succession lorsque l'employeur veut licencier des salariés du fait du manque de travail, ou les mettre en chômage. L'ordre de succesion sera en principe déterminé par la durée de présence du salarié dans l'entreprise. Le salarié qui a été licencié pour cause de manque de travail bénéficie, pendant un an à compter de la suppression de son emploi, de la priorité pour un réembauchage chez l'employeur. Certaines conventions collectives contiennent des clauses divergentes pour l'ordre de succession et la priorité de réembauchage.

Les règles relatives au préavis et à la concertation permettent aux organisations des salariés d'exercer un droit de regard sur la politique du personnel de l'entreprise et d'avoir la possibilité d'agir sur l'employeur. Un préavis doit être notamment donné si l'employeur envisage de procéder à des licenciements ou des mises en chômage, ou s'il entend conclure un accord pour une nouvelle embauche lorsqu'un ancien salarié a la priorité.

Si l'employeur enfreint les prescriptions légales, il est redevable d'une indemnité. Pour déterminer si et dans quelle mesure il y a préjudice, il convient de tenir compte également du préjudice moral. Dans le cas où l'employeur a passé outre à l'invalidation d'un licenciement prononcée par un tribunal, l'indemnité sera de 1 à 52 fois le salaire mensuel, selon l'ancienneté du salarié dans l'entreprise.

Loi sur les mesures de promotion de l'emploi

La loi s'applique aux deux secteurs, public et privé. Aux termes de cette loi, un employeur est tenu de déposer un préavis au Comité préfectoral du travail un certain temps avant de procéder à une réduction d'activité. Si la réduction d'activité est susceptible d'entraîner des licenciements, la durée du préavis est de deux à six mois, selon le nombre de salariés concernés.

La loi contient en outre des règles qui visent à donner aux vieux travailleurs ainsi qu'à ceux dont la capacité de travail est réduite de meilleures possibilités de conserver ou d'obte-

nir un emploi sur le marché ouvert du travail. Ces règles se fondent sur l'idée que les services du marché du travail doivent discuter avec les employeurs et les organisations concernées des mesures à prendre à cet effet. Ces règles appuient l'action des groupes dits d'adaptation qui a commencé d'être menée ces derniers temps dans les entreprises. A défaut de se mettre d'accord sur des solutions par voie de concertation, les services du marché du travail peuvent donner à l'employeur des directives sur les mesures qu'il doit prendre. Si les directives édictées par la Direction nationale du travail ne sont pas suivies, et s'il apparaît manifeste qu'une rectification ne peut être obtenue d'une autre manière, la Direction du travail peut ordonner en dernier recours que l'employeur n'embauche que des salariés désignés ou approuvés par les services officiels de l'emploi.

Loi sur la situation du représentant syndical sur le lieu de travail

La loi se propose de favoriser le travail syndical, lequel est la condition d'une réalisation complète des réformes entreprises ces dernières années dans le domaine de la vie du travail. Elle s'applique à l'ensemble du marché du travail suédois. L'application de la loi repose sur l'emploi par l'employeur du délégué et sur son activité au niveau du lieu de travail. C'est l'organisation syndicale locale liée, ou généralement liée par la convention collective concernant le lieu de travail, qui est responsable de l'activité syndicale visée par la loi. C'est aussi cette organisation qui désigne les salariés appelés à faire fonction de représentants.

Un délégué syndical ne doit pas être entravé dans sa tâche par l'employeur. La loi lui accorde en outre une protection contre une détérioration de ses conditions de travail provoquée par sa mission syndicale.

En cas de réduction d'activité, le délégué peut conserver son emploi en priorité à condition que ses tâches syndicales soient particulièrement importantes pour l'activité poursuivie sur le lieu de travail.

Le délégué, en outre, a droit au congé nécessaire à l'accomplissement de ses fonctions syndicales. Mais ce congé ne doit

pas excéder une durée raisonnable compte tenu des conditions du lieu de travail en question et doit être disposé de façon à ne pas perturber outre mesure la marche requise du travail. Le congé sera déterminé en premier lieu après concertation avec l'employeur.

Les activités syndicales ayant trait au lieu de travail pourront être exercées pendant les heures de travail et sans perte de salaire.

La loi implique qu'en cas de litige, c'est l'organisation syndicale qui décide de l'application de la loi dans l'attente du règlement, conformément à la priorité qui lui est donnée en matière d'interprétation. Il n'y a exception que lorsqu'il y a menace pour la sécurité sur le lieu de travail, d'importantes fonctions collectives ou intérêts assimilables. Si le syndicat est à l'origine d'une application erronée de la loi et s'était rendu compte, ou aurait manifestement dû se rendre compte de l'erreur, il peut être condamné à des dommages-intérêts. Le délégué par contre est dégagé de toute responsabilité s'il agit avec l'accord de son organisation.

La plupart des clauses ont un caractère dispositif c.-à-d. qu'elles doivent pouvoir s'adapter au travers des conventions collectives aux conditions variables existant sur les divers lieux de travail. Mais les clauses fondamentales visant la protection du représentant syndical sont impératives.

Loi sur la procédure des litiges du travail

Dans le but de favoriser une pratique judiciaire unifiée dans les litiges du travail, le législateur stipule que les litiges mettant en jeu des partenaires syndiqués seront directement arbitrés par la Cour du travail et ce, en première et dernière instance, tandis que les litiges opposant des partenaires non organisés seront d'abord soumis au tribunal de première instance, d'où ils pourront être déférés sans restriction à la Cour du travail en seconde et dernière instance.

Ces règles, dans leur principe, visent tous les types de litiges, même ceux du secteur public. Ceux-ci devront donc, davantage que par le passé, faire l'objet d'une procédure civile, limitant d'autant le recours administratif du domaine public.

La procédure devant la Cour du travail s'écarte par certains côtés des règles du Code de procédure relatives au règlement des litiges. La composition de la Cour du travail est également différente de celle du tribunal courant, notamment par la présence de représentants des organisations du marché du travail.

Une procédure simplifiée peut être appliquée pour les litiges du travail mettant en jeu des valeurs inférieures actuellement à 3.950 couronnes.

LA LOI SUR LA SECURITE DE L'EMPLOI

Domaine d'application de la loi

La loi vise en principe toutes les situations d'emploi, que ce soit dans le secteur public ou privé. Elle ne fait pas de distinction entre les catégories professionnelles et s'applique indifféremment aux salariés syndiqués et non syndiqués, de même qu'aux travailleurs à temps partiel, aux travailleurs à domicile, etc.

Par contre elle n'englobe pas les relations créées par le travail sur commande, les rapports au niveau des sociétés et des associations de personnes. La loi fait également exception pour les dirigeants d'entreprise, leur famille, de même que pour les salariés employés à des travaux d'intérêt public, ceux placés dans le cadre des activités protégées, etc. Quant à ceux employés au foyer de l'employeur, c'est la loi sur les horaires, etc. du travail domestique qui s'applique à la place.

Certaines des règles de la loi exigent que le salarié ait atteint un certain âge ou ait une certaine durée de présence. Mais ces exigences ne s'appliquent pas aux dispositions fondamentales de la loi. Dans certains cas, les règles peuvent varier eu égard à la forme de l'emploi, emploi à durée indéterminée ou emploi à durée déterminée ou en vue d'une certaine tâche.

Dispositions divergentes

Des dispositions divergentes ou complémentaires peuvent être prévues par d'autres textes de loi. C'est le cas par exemple

pour les fonctionnaires de l'Etat et des catégories professionnelles comme les gens de maison, les marins et les voyageurs de commerce.

La plupart des règles contenues dans la Loi sur la sécurité de l'emploi sont valables également pour les employés du secteur public. Cela signifie notamment une limitation de la possibilité de nommer un fonctionnaire pour une durée déterminée et l'application, en cas de licenciement, de la règle du préavis et de la concertation conformément à la loi. Jusqu'à nouvel ordre, on fait exception pour les règles d'ordre de succession et de priorité de réembauche. Sous ces rapports, d'autres pourparlers sont nécessaires avec les organisations du personnel.

La loi interdit en outre que l'employeur congédie un salarié dans certaines situations telles que service militaire, mariage et grossesse.

Une partie des règles de la loi peuvent être remplacées ou complétées par des dispositions adaptées à la branche ou l'entreprise considérées. Ces dispositions, fixées par voie contractuelle, devront généralement être prises sur le plan fédéral, mais des accords locaux peuvent également avoir leur importance. L'employeur lié par une telle convention collective pourra l'appliquer aussi aux salariés non-syndiqués.

Différentes formes d'emploi

La loi se rapporte essentiellement aux emplois à durée indéterminée. Elle limite volontairement les emplois à durée déterminée, les emplois saisonniers et ceux relatifs à une certaine tâche. La raison en est que la sécurité de l'emploi y est réduite.

Les emplois pour un certain temps, une certaine saison ou une certaine tâche ne devront donner lieu à un contrat de travail que s'ils sont justifiés par la nature particulière du travail à accomplir. On peut citer à ce propos les travaux de spécialiste isolés, les emplois saisonniers dans l'agriculture ainsi les emplois dits à objet déterminé dans l'industrie du bâtiment.

La loi permet de même l'emploi à durée déterminée lorsqu'il s'agit de stages et de remplacements. Avec l'appui des conven-

tions collectives, l'emploi à l'essai pourra avoir lieu pour un certain temps. Toujours dans le cadre des conventions collectives, d'autres contrats à durée déterminée pourront être conclus, ainsi en cas de surcharge temporaire de travail. Des règles particulières relatives aux nominations à durée déterminée valent pour le secteur régi par l'Etat.

Le Comité préfectoral du travail peut intervenir contre l'employeur qui fait appel aux emplois à durée déterminée d'une manière contraire aux usages en vigueur sur le marché du travail.

La cessation du contrat de travail

L'emploi à durée indéterminée peut cesser par voie de résiliation à l'issue d'un certain délai-congé. Ceci indépendamment de la partie qui prend l'initiative de la rupture. Cependant, la résiliation de la part de l'employeur doit être motivée objectivement.

Quant à l'emploi à durée déterminée ou saisonnier ou relatif à une certaine tâche, à moins que le contrat ne dispose autrement, il cesse sans préavis à l'expiration de la durée de l'emploi ou lorsque la tâche a été menée à bonne fin. Dans certains cas cependant, le salarié peut bénéficier d'une priorité de réembauche auprès de l'employeur.

Si, dans un contrat de travail, l'une des parties a gravement négligé ses obligations telles qu'elle découlent du contrat, la partie adverse peut le résilier avec effet immédiat. En outre, des indemnités peuvent être dues dans ce cas.

Causes de résiliation, congédiement

La résiliation de l'emploi opérée par l'employeur doit être fondée objectivement. Cela vaut aussi bien en cas de réduction d'activité, etc. que dans celui où la résiliation est due à des circonstances personnelles.

Lorsque la rupture n'est pas motivée objectivement, le tribunal, à la requête du salarié, la déclarera non valable. Dans ce cas, le contrat continue aux mêmes conditions qu'auparavant. Même pendant la durée du procès, le salarié est garanti contre la rupture. Si, ensuite, l'employeur refuse d'obtempérer selon les termes du jugement, il peut lui être enjoint de verser des dommages-intérêts au salarié.

Le texte de loi ne précise pas ce qu'il convient d'entendre par motif objectif de résiliation ou de licenciement. Et cela parce qu'on a considéré qu'il n'était pas possible, vu la diversité des cas et des conditions de travail, d'établir de façon générale ce qui serait une cause de rupture. Il est toujours nécessaire de prendre en considération les circonstances qui entourent un cas particulier. On distinguera par ex. les conditions régnant dans une grande entreprise d'avec celles d'une petite entreprise. L'appréciation pourra également être influée par le fait que le salarié se trouve dans une position particulière de responsabilité, entre autres. En dernière analyse, c'est le tribunal qui appréciera s'il peut être raisonnablement exigé de l'employeur de maintenir le contrat de travail.

En plusieurs points, la loi rompt avec la pratique en vigueur jusque-là, en matière de licenciement, d'une manière favorable au salarié. Il convient de souligner en particulier l'obligation pour l'employeur de proposer au salarié un autre travail si on peut raisonnablement la lui imposer.

La maladie, la réduction de capacité etc. ne constituent pas, en principe, de fondement objectif à un licenciement, sauf si le salarié n'est plus à même d'exécuter des tâches d'importance majeure. Dans les autres cas, il incombe à l'employeur, notamment en faisant appel aux moyens offerts par les mesures de politique de l'emploi, de chercher à réaffecter le salarié à une tâche moins pénible. Des groupes dits d'adaptation ont été créés dans un certain nombre d'entreprises et de services publics pour se charger des problèmes que rencontrent surtout les vieux et les handicapés sur le marché du travail.

En cas de négligence grave de la part du salarié, la recherche de l'éventuel fondement objectif ne devra pas se concentrer sur les faits survenus dans le cas particulier mais sur les conclusions pouvant être tirées de ces faits quant à la qualification du salarié. Le licenciement ne devra intervenir que si la non-qualification à la poursuite de l'emploi occupé est effectivement documentée. La loi contient aussi une clause stipulant que le licenciement ne doit pas se fonder uniquement sur une circonstance connue de l'employeur depuis un mois. Il est souvent exigé aussi que l'employeur ait déjà précédemment averti le salarié.

Si des difficultés de collaboration doivent aboutir à la rupture du contrat de travail, elles doivent de caractère grave. Il est généralement exigé de l'employeur qu'il ait cherché auparavant à régler le problème par l'affectation du salarié à un autre poste.

L'activité syndicale ne constitue pas un motif objectif de licenciement. La participation à un conflit syndical, normalement, n'est pas non plus un motif valable. Cette constatation s'applique tout particulièrement aux conflits licites.

Sont exclus également des motifs valables les licenciements pour cause de nationalité, religion, couleur, opinions politiques, etc.

Lorsque le salarié se rend coupable de comportements graves, par ex. vol qualifié sur le lieu de travail, ivresse répétée pendant les heures de service, etc., il pourra être congédié sans préavis. Dans les autres cas de négligence grave, qui donnent lieu à un licenciement, l'employeur doit par contre observer les délais de préavis.

Le manque de travail et les situations assimilées, par ex. réductions d'activité et changements d'organisation, en règle générale, constituent des motifs objectifs de licenciement. Mais il convient auparavant de recourir d'abord à des mesures telles que changement de poste, départ naturel ou réduction progressive du volume de travail. Des règles légales ou conventionnelles assurent aux organisations syndicales et aux Comités préfectoraux du travail une certaine influence sur la réalisation d'une réduction d'activité. Il incombe de même encore à l'employeur de suivre un certain ordre de succession. Dans de nombreux cas, un salarié licencié pour manque de travail a une priorité chez l'employeur pour le réembauchage et ce, pendant un an après la cessation de l'emploi.

Réaffectation

Avant de procéder à un licenciement, l'employeur devra avoir cherché à donner au salarié un autre travail dans son entreprise. L'obligation de réaffectation vaut aussi bien pour les réductions d'activité que dans les cas de congédiement personnel. Mais cette obligation n'a pas un caractère absolu et doit tenir

compte des circonstances. Lorsque le salarié s'est rendu coupable de négligences graves, il ne peut exiger son affectation à un autre poste.

A commencer, l'employeur est redevable d'offrir au salarié une occupation équivalente sur le même lieu de travail. Si celui-ci refuse, sans raison valable, le travail ainsi offert, l'employeur n'est généralement plus obligé de faires d'autres offres.

L'une des conditions d'une réaffectation est évidemment la possibilité de mettre à la disposition des salariés concernés une place différente. En aucun cas, elle ne devra aboutir à la mise à pied d'autres salariés.

La procédure du licenciement

La résiliation du contrat de travail opérée par l'employeur devra être écrite. Il devra y indiquer les points à observer par le salarié si celui-ci estime la mesure non valable et désire la faire examiner par un tribunal.

Si le licenciement est causé par un manque de travail etc. et si le salarié a un droit prioritaire à un nouvel emploi chez son employeur, l'avis de licenciement devra en faire mention.

Les circonstances qui ont donné lieu au licenciement n'ont pas besoin de figurer dans l'avis de licenciement. Mais le salarié peut demander que les raisons lui en soient données par écrit.

L'avis de licenciement devra être remis au salarié personnellement ou, en cas d'impossibilité, lui être adressé par lettre recommandée. Le fait par lui d'"acquitter" ainsi l'avis de licenciement ne signifie pas qu'il l'ait accepté.

Le délai de préavis commence à courir à partir de la réception de l'avis de licenciement par le salarié. Mais même si, par ex., il refuse de retirer de la poste la lettre recommandée, le délai de préavis commence à courir après une semaine. Lorsqu'un salarié est licencié pendant les congés, le délai prend effet à la date de la reprise du travail.

Préavis, salaire de licenciement, etc.

Lorsque le contrat de travail est résilié par l'employeur, la durée minimum du préavis est de un mois. Si le salarié a été employé pendant six mois de suite ou pendant au mois douze mois au total au cours des deux dernières années, la durée du préavis est prolongée, à savoir jusqu'à

- deux mois, si le salarié a 25 ans révolus,
- trois mois, si le salarié a 30 ans révolus,
- quatre mois, si le salarié a 35 ans révolus,
- cinq mois, si le salarié a 40 ans révolus,
- six mois, si le salarié a 45 ans révolus.

Pour le calcul de la durée de l'emploi, le salarié a le droit d'y faire figurer l'emploi occupé chez un autre employeur faisant partie du même groupe que l'employeur actuel. Il pourra de même invoquer la durée de l'emploi occupé chez l'employeur précédent en cas de vente, etc. de l'entreprise.

L'employeur qui désire faire cesser le contrat de travail dans le cadre de la mise à la retraite devra, au lieu de procéder au licenciement, informer le salarié un mois à l'avance. Si le salarié continue d'occuper son emploi après l'âge de la retraite, le préavis est alors d'un mois.

Lorsqu'il y a rupture du contrat de travail à l'initiative du salarié, le préavis est d'un mois.

Les conventions collectives aussi bien que des accords particuliers peuvent prévois des préavis plus courts ou plus longs.

Pour le salarié qui, au cours des deux dernières années, a été employé pendant un total d'au moins douze mois dans le cadre d'un contrat à durée déterminée ou en vue de l'accomplissement d'une certaine tâche, l'employeur, au lieu d'observer les règles du délai-congé, etc. devra informer le salarié un mois avant la cessation de l'emploi s'il ne peut lui offrir la reconduction du contrat. Et ceci, aussi bien si la cause en est le manque de travail ou les circonstances personnelles du salarié. Ces règles valent également pour le travail saisonnier.

Pendant la durée du préavis, le salarié a droit à son salaire normal même si l'employeur n'était pas en mesure, pour tout ou pour partie, de lui offrir du travail. La condition en est toutefois que le salarié se trouve à la disposition de l'employeur. Un salarié en congé de maladie par conséquent ne peut pas, d'une manière générale, revendiquer de salaire de licenciement. De ce salaire de licenciement, l'employeur peut défalquer les revenus

gagnés par le salarié, pendant la période considérée, ailleurs que chez lui ou que le salarié aurait manifestement pu gagner dans un autre emploi qu'il aurait normalement dû accepter. Par conséquent, si l'employeur ne peut offrir de travail pendant la durée du préavis, le salarié est en principe obligé de se mettre à la disposition du marché du travail.

Si l'entreprise de l'employeur est mise en faillite, le salaire de licenciement est protégé par les règles des créances privilégiées et la garantie de salaire de l'Etat.

Pendant la durée du préavis, le salarié ne devra pas être déplacé vers une autre localité si ses chances de trouver un autre emploi devaient en être nettement diminuées.

Il est également en droit, pendant le préavis, de se rendre dans les agences de l'emploi ou autrement de chercher du travail pendant ses horaires de travail qui restent rémunérés.

Rien ne met obstacle à ce que le préavis soit placé pendant les congés. Par contre, faire coïncider les congés avec le préavis, lorsque ce dernier se situe à une période de l'année normalement considérée comme impropre aux vacances, peut aller à l'encontre de la Loi sur les congés payés ou des conventions collectives.

Salaire pendant la mise en chômage

Les salariés qui se sont trouvés en chômage technique pendant plus de deux semaines consécutives ou un total de plus de 30 jours au cours d'une même année civile, ont droit au salaire de mise en chômage pour le temps excédentaire chômé, et ceci indépendamment de la cause de la mise en chômage.

Le salaire de mise en chômage - ou de suspension du contrat de travail - est le même que les revenus normaux procurés au salarié par son travail. Lorsque la mise en chômage revêt la forme d'une réduction d'horaires ou analogue, l'employeur est en devoir de verser la différence.

Pour le reste, et de façon générale, les règles qui s'appliquent au salaire de mise en chômage sont les mêmes que celles du licenciement. Mais il n'y a pas de règle de défalcation, par ex. pour ce que le salarié aurait pu gagner ailleurs.

Ordres de succession

En cas de licenciement pour manque de travail et de mise en chômage, l'employeur devra observer certaines règles de succession. Des règles analogues s'appliquent à la reprise de travail après la mise en chômage et au réembauchage.

Il est dans la nature des choses que ces règles n'ont de raison d'être que lorsqu'il est question de choix entre différents salariés.

Ces règles comprennent d'une part des dispositions qui précisent quels salariés doivent former l'ordre de succession, de l'autre des dispositions sur la place du salarié individuel dans cet ordre et au sein de son propre cercle.

Lorsque les activités de l'employeur se répartissent en plusieurs unités - usine, magasin, service public - chacune de ces unités d'exploitation constitue, sous le rapport des ordres de succession, un secteur à part. Si l'employeur est lié, ou habituellement lié par des conventions collectives, le secteur se partage alors également selon les domaines conventionnés. Par conséquent, dans chacun des domaines régis par une convention est fixé un ordre de succession particulier. Mais à l'intérieur de son domaine de convention, une organisation syndicale peut exiger que soit fixé un ordre de succession commun à toutes les unités d'exploitation de l'employeur situées dans une localité, par ex. tous les magasins d'une chaîne.

Dans le secteur ainsi défini, la place du salarié dans l'ordre de succession tient compte du temps total qu'il a été employé chez son patron, ou chez un autre patron du même groupe d'entreprise ou chez son précédent employeur si l'entreprise a été vendue. La priorité est accordée aux salariés ayant la durée d'emploi la plus longue. Lorsque plusieurs salariés font état du même temps de présence, c'est l'âge qui les départage, les plus âgés ayant priorité. De façon générale, ceux qui ont plus de 45 ans sont avantagés. Quant aux handicapés placés à un poste de travail spécial ou aux représentants syndicaux ayant une activité importante, ils devront en principe être assurés du maintien de leur emploi.

Pour un salarié à qui l'employeur ne peut aménager de travail qu'après une affectation à un autre poste, la condition de la

priorité est qu'il possède suffisamment de qualifications pour la poursuite du travail. Dans certains cas par conséquent, les qualifications professionnelles peuvent influer sur l'ordre de succession.

Les conventions collectives elles aussi peuvent établir des règles de succession, ainsi sur le plan local où un accord peut prévoir, dans un cas particulier, la composition appropriée d'une équipe de travail. Mais il n'est pas permis par ex. de s'entendre sur une liste visant à écarter unilatéralement les membres appartenant à d'autres organisations.

Les règles d'ordre de succession ne sont pas applicables jusqu'à nouvel au secteur régi par l'Etat. Cette question fait l'objet actuellement d'une étude.

La priorité au nouvel emploi

Le salarié dont l'emploi a cessé pour manque de travail a droit à un nouvel emploi, c.-à-d. au réembauchage. Il faut aussi qu'il ait, à la date de la cessation de l'emploi, été employé pendant au moins douze mois (six mois pour le travail saisonnier) au cours des deux dernières années. Peu importe qu'il se fût agi d'un contrat à durée indéterminée ou d'un contrat à durée ou à tâche déterminées.

Le droit à la priorité vaut pendant un an après la cessation du précédent emploi. Il ne s'applique que dans l'unité d'exploitation et au sein du domaine conventionné où était occupé le salarié. En ce qui concerne l'ensemble des unités d'exploitation du lieu considéré et les qualifications requises au nouvel emploi, les règles sont les mêmes que pour l'ordre de succession. Les règles d'ordre de succession s'appliquent lorsque plusieurs salariés entrent en concurrence pour l'emploi.

Le salarié qui prétend à un emploi doit le faire savoir à l'employeur. L'employeur est redevable de l'en informer.

Le salarié perd son droit de priorité s'il refuse une offre d'emploi qu'il aurait raisonnablement dû accepter. Le critère d'offre de travail raisonnable est le même que pour l'assurance chômage. Le salarié bénéficie d'un délai approprié de réflexion avant de prendre le nouvel emploi.

Les règles relatives à la priorité concernant le nouvel emploi, tout comme celles qui se rapportent à l'ordre de succession, peuvent être remplacées dans les conventions collectives par des règles différentes. Mais cela ne s'applique pas, jusqu'à nouvel ordre, au domaine de l'Etat.

Préavis et pourparlers

Avant qu'employeur ne soit en droit d'effectuer un licenciement, une mise en chômage, un nouvel embauchage, etc. il a le devoir d'avertir les organisations syndicales locales. S'agit-il d'un cas de licenciement personnel, il devra également en avertir d'avance le salarié. Et l'employeur devra faire connaître la mesure au syndicat même si le salarié concerné n'est pas syndiqué.

Le but de ces règles d'avertissement est de permettre aux organisations syndicales d'exercer un droit de regard sur la politique du personnel poursuivie par l'employeur et de demander à avoir avec lui des pourparlers, par ex. de proposer d'autres solutions, l'ajournement de la mesure, etc.

S'il s'agit de réductions d'activité, information devra aussi en être donnée au Comité préfectoral du travail en vertu de la Loi sur les mesures de promotion de l'emploi. Les conventions collectives peuvent d'ailleurs prévoir une obligation d'avertissement renforcée.

Les délais de ces préavis varient avec la nature de la mesure envisagée. Ils sont généralement de un mois pour les réductions d'activité, notamment pour permettre d'établir l'ordre des successions des salariés concernés. Les règles d'avertissement ont d'ailleurs été coordonnées, l'employeur devant prévenir organisations syndicales et Comité préfectoral du travail simultanément.

Celui qui bénéficie du régime de ce préavis a aussi droit aux pourparlers avec l'employeur. Dans les cas de licenciement personnel, l'organisation syndicale aussi bien que le salarié concerné peuvent demander à s'entretenir avec le patron. Une fois demandé un tel entretien, l'employeur ne peut prendre la mesure envisagée avant de fixer une date pour les pourparlers.

Pour le cas des réductions d'activité, il est possible de constituer auprès de l'entreprise un groupe dit de concertation auquel participent également des représentants du Comité préfectoral et de la commune.

Procédure en cas de conflit, dommages-intérêts

A la demande du salarié, un licenciement non fondé objectivement devra être déclaré non valable. En outre, des dommages-intérêts pourront être reconnus au salarié pour le préjudice subi par la mesure de licenciement.

Lorsque le salarié engage une action judiciaire d'invalidation du licenciement, le contrat de travail reste en vigueur jusqu'à ce que le litige soit tranché, c.à-d. dans certains cas même après l'expiration du délai-congé. Le salarié a en principe le droit de garder son travail jusqu'à nouvel ordre et, sauf raisons particulières, il ne peut en être privé. Mais le tribunal, lorsqu'il estime le licenciement fondé, peut décider de faire cesser l'emploi à l'expiration du préavis, même si, à cette date, l'instance n'est pas terminée.

Les règles de maintien dans l'emploi sont les mêmes lorsqu'il y a eu renvoi du salarié alors qu'il y aurait manqué même le fondement objectif du licenciement.

La condition d'application des règles mentionnées plus haut est que le salarié avise immédiatement l'employeur de ses prétentions et qu'il engage une action d'invalidation. D'ailleurs l'employeur, comme déjà indiqué, a le devoir d'informer le salarié dans l'avis de licenciement ou l'avis de renvoi des règles que celui-ci doit observer.

Lorsque le tribunal a invalidé un licenciement ou un renvoi, l'employeur est obligé de maintenir l'emploi du salarié. S'il refuse de reprendre le salarié ou de lui donner du travail, il pourra être condamné à des dommages-intérêts qui équivaudront à

- 16 mois de salaire si la présence du salarié dans l'entreprise est inférieure à cinq ans,
- 24 mois de salaire si la présence du salarié dans l'entreprise est supérieure à cinq ans,
- 32 mois de salaire si la présence du salarié dans l'entreprise est supérieure à dix ans.

Des règles de calcul plus avantageuses s'appliquent lorsque le salarié a plus de 45 ans. Et le montant des dommages-intérêts s'élève à 24, 36 et 48 mois de salaire respectivement si le salarié à 60 ans révolus. Mais les dommages-intérêts n'équivaudront jamais à davantage de mois de salaire que le nombre des mois de présence du salarié dans l'entreprise.

Lorsqu'un salarié a été licencié sans raison, il n'est pas nécessaire qu'il demande l'invalidation de la mesure de licenciement. Il peut au lieu de cela quitter son emploi et demander des dommages-intérêts. Les dommages-intérêts pourront alors englober le préjudice subi par la mesure même du licenciement aussi bien que le manque à gagner à venir. Dans cette seconde partie, les dommages-intérêts se limitent cependant au nombre de mois de salaire mentionnés ci-dessus.

Dans d'autres cas également des dommages-intérêts peuvent être dûs, ainsi lorsque l'employeur n'observe pas l'ordre de succession en vigueur ou qu'il refuse au salarié la priorité à un nouvel emploi. Mais dans ces situations, il ne peut pas y avoir de déclaration d'invalidation.

Des dommages-intérêts peuvent encore être dûs à une organisation syndicale, par ex. lorsque l'employeur néglige d'avertir les instances énumérées plus haut sur une réduction envisagée de son activité. Le syndicat peut de même se faire accorder des dommages-intérêts pour l'intérêt moral qu'ont ses membres à ce que les dispositions légales soient respectées.

Mais un salarié également peut être condamné à des dommages-intérêts lorsqu'il quitte son emploi sans observer le préavis prescrit.

Le montant des dommages-intérêts, dans certains cas, peut faire l'objet d'un compromis. Les demandes de dommages-intérêts, tout comme pour les autres mesures, devront être portées à la connaissance de la partie adverse, et l'action engagée dans un certain délai assez court.

La procédure judiciaire

Les litiges concernant le licenciement et les autres instances relatives à la Loi sur la sécurité de l'emploi sont traités selon la nouvelle Loi sur la procédure des litiges du travail. Il en sera fait un compte rendu dans un chapitre ultérieur.

Lorsqu'un litige implique un salarié syndiqué, il est directement pris en charge par la Cour du travail. C'est alors que l'organisation du salarié plaide normalement pour le compte de son membre. Lorsque le salarié n'est pas affilié à un syndicat, le litige est d'abord soumis au tribunal de première instance pour

pouvoir, le cas échéant, être déféré en appel devant la Cour du travail. C'est le tribunal de première instance du domicile du salarié qui doit connaître du litige. La sentence de la Cour du travail ne peut pas être attaquée en appel.

Les litiges de licenciement doivent être examinés avec célérité. Certaines questions, ainsi celle du droit de mettre à pied un employé, bénéficient d'une priorité particulière.

Lorsque l'action judiciaire est engagée par une organisation, celle-ci supporte généralement les frais de procédure. Si c'est le salarié lui-même, il pourra à certaines conditions bénéficier de l'assistance judiciaire. La loi contient en outre une clause avantageuse pour le partenaire travailleur au cas où celui-ci perdrait le procès. En effet, il ne pourra être condamné à payer les frais de l'employeur s'il avait une raison plausible de faire examiner le litige par une instance judiciaire.

Dans certains cas, les litiges nés à l'occasion d'un licenciement par ex. pourront être soumis à une commission arbitrale.

Entrée en vigueur, etc.

La nouvelle loi est applicable à partir du 1er juillet 1974. Elle met fin en même temps aux lois dites anciennes de 1971.

La nouvelle loi ne s'applique pas aux licenciements, mises en chômage, etc. dont l'origine est antérieure à sa mise en vigueur. Ce sont les dispositions des lois anciennes ou autres, ou les règles des conventions collectives qui leur sont applicables.

L A L O I S U R L E S M E S U R E S D E P R O M O T I O N D E L ' E M P L O I

Préavis de réduction d'activité

L'employeur devra déposer un préavis au Comité préfectoral du travail sur les réductions d'activité qui concernent au moins cinq salariés. Il y a obligation de dépôt de préavis, non seulement pour les licenciements, mais aussi pour les mises en chômage et les autres cas de non-maintien de l'emploi. Mais cette obligation ne s'étend pas aux réductions d'activité qui

constituent un aspect normal de la marche de l'entreprise.

Les délais pour le dépôt du préavis varient suivant la mesure envisagée par l'employeur et le nombre des salariés qu'elle touche.

En cas de licenciement, le dépôt du préavis devra avoir lieu
- deux mois avant la réduction d'activité si le nombre des salariés concernés ne dépasse pas 25,
- quatre mois avant la réduction d'activité si le nombre des salariés concernés ne dépasse pas 100,
- six mois avant la réduction d'activité si le nombre des salariés concernés est supérieur à 100.

En cas de mise en chômage, le dépôt du préavis devra avoir lieu un mois à l'avance. Pour les salariés ayant un contrat à durée déterminée, etc. ce délai est de six semaines.

Dans certains cas, les délais sont plus longs par suite d'une règle spéciale prévoyant le dépôt au Comité préfectoral du travail simultanément au préavis donné par l'employeur à l'organisation syndicale conformément à la Loi sur la sécurité de l'emploi.

L'employeur qui n'aura pu à temps prévoir les circonstances conduisant à une réduction d'activité pourra effectuer le dépôt du préavis aussitôt que possible.

Le préavis devra contenir les indications relatives à la cause et au type de réduction d'activité, à la date à laquelle elle est destinée à avoir lieu et au nombre de salariés concernés, répartis par catégories professionnelles. Aussitôt que possible, c.-à-d. lorsque la liste des licenciements ou mises en chômage est établie après pourparlers avec l'organisation syndicale, il conviendra de donner le nom des personnes touchées par la mesure.

Des règles particulières peuvent s'appliquer à certaines branches, par ex. l'industrie du bâtiment. Autrement, la règle principale est que la loi vaut tant pour le secteur public que pour le secteur privé.

Lorsque la réduction d'activité revêt une certaine ampleur, il sera formé un groupe dit de concertation comprenant des représentants du Comité préfectoral du travail et de la commune, en plus de ceux de l'employeur et des salariés. La tâche du groupe

de concertation est avant tout de chercher à faciliter la réduction d'activité de manière à ce qu'elle puisse s'opérer avec le moins d'effets nuisibles pour les salariés.

L'employeur qui, intentionnellement ou par négligence grave, omet de déposer le préavis dans les délais prescrits, pourra être contraint de verser une indemnité dite de préavis au Trésor public. Cette indemnité est de 100 à 500 couronnes par semaine et par salarié concerné. Il pourra également s'attendre à ce que la Direction nationale du travail, dans de nombreux cas, demandera que la réduction d'activité soit reportée un nombre de jours correspondant.

Obligation d'informer

Le Comité préfectoral du travail peut exiger - si cela s'avère nécessaire pour prendre des mesures de promotion de l'emploi des vieux salariés et des salariés à capacité de travail réduite - que l'employeur indique :

- l'importance, la composition, etc. de la main-d'oeuvre
- le nombre de salariés ayant atteint un certain âge ou ayant une capacité réduite,
- les changements qui doivent intervenir, par ex. licenciements, mises en chômage, réaffectations, places vacantes.

Mesures de promotion de l'emploi des vieux salariés et des salariés à capacité de travail réduite

Le Comité préfectoral du travail peut demander à avoir des pourparlers avec un employeur sur

- les mesures aptes à améliorer les conditions de travail ou à garantir le maintien de l'emploi des salariés âgés ou handicapés,
- l'embauchage ou les mesures de promotion d'embauchage de ces catégories de salariés.

Ces règles visent avant tout à appuyer la coopération tripartite entre employeurs, agences de la main-d'oeuvre et organisations syndicales qui s'est instaurée en la forme de groupes dits d'adaptation, surtout dans les moyennes et grandes entreprises. Mais les règles valent également pour les petites entreprises.

Lorsqu'il n'est pas possible d'arriver à un accord en matière de politique du personnel, l'affaire peut être soumise au Comité préfectoral du travail et de là à la Direction nationale du travail. Comité préfectoral et Direction du travail peuvent également donner des instructions à l'employeur sur les mesures devant être prises pour améliorer les conditions d'emploi des vieux et des handicapés et l'inviter à accroître, parmi les nouveaux embauchés, la proportion de ces types de salariés. En dernier ressort, les services publics peuvent lui enjoindre de ne pas embaucher d'autres employés que ceux présentés ou approuvés par l'agence de la main-d'oeuvre.

La Direction nationale du travail peut encore entreprendre des négociations et définir des instructions pour toute une branche ou une partie de celle-ci ayant en vue d'améliorer la situation sur le marché du travail des personnes âgées et handicapées.

Autres dispositions

Le Comité préfectoral du travail peut édicter des dispositions qui restreignent le droit de l'employeur de conclure des contrats de travail à durée déterminée, si l'employeur néglige de tenir compte des clauses qui y ont trait dans la Loi sur la sécurité de l'emploi ou si, de toute autre manière, il agit en contradiction avec les bons usages du marché du travail.

La sécurité de l'emploi est renforcée pour les représentants syndicaux aux groupes d'adaptation, entre autres.

Il y a obligation de secret pour tous ceux que l'application de la loi met en présence de renseignements de caractère personnel ou relatifs aux conditions commerciales ou de fonctionnement d'une entreprise.

Il appartient au gouvernement ou à la Direction nationale du travail de disposer en matière d'exceptions à certaines règles de loi et d'édicter les règlements d'application. De tels règlements d'application ont par ex. été promulgués au sujet des dépôts de préavis. Il existe notamment des formulaires destinés au dépôt des préavis.

Entrée en vigueur

La Loi sur certaines mesures de promotion de l'emploi est entrée en vigueur le 1er juillet 1974, mettant simultanément fin à la

législation provisoire en la matière de 1971. Prend également fin à cette date l'accord dit du dépôt de préavis passé entre la Direction nationale du travail et les grandes centrales.

LA LOI SUR LA SITUATION DU REPRESENTANT SYNDICAL DANS L'ENTREPRISE

Les délégués concernés par la loi

La loi s'applique aux délégués syndicaux employés dans l'entreprise et désignés par les organisations liées, ou qui sont habituellement liées, par les conventions collectives destinées au lieu de travail considéré. Elle ne s'applique donc pas aux permanents d'une organisation syndicale ni aux salariés représentant une organisation qui n'est pas partie aux conventions collectives régissant le lieu de travail.

Le délégué doit être désigné réglementairement par l'organisation syndicale locale. C'est l'organisation, par avis donné à l'employeur, qui rend la loi applicable au délégué. Pour le reste également, c'est l'organisation, non son représentant, qui décide en matière d'application de la loi.

Ces conditions posées, la loi s'applique à tout délégué qui représente les salariés dans les questions concernant les relations avec l'employeur ou dans toutes autres questions relatives à l'activité syndicale. Le nombre des délégués sur un certain lieu de travail n'est pas limité, mais de nombreuses règles de la loi qui sont importantes dans la pratique disposent cependant que l'activité syndicale doit revêtir des proportions raisonnables eu égard aux conditions du lieu de travail.

L'activité syndicale

L'activité syndicale visée par la loi est l'activité traditionnelle comme la négociation, le travail au comité d'entreprise, etc. Elle s'applique également aux délégués dits de contact ou délégués des lieux de travail des petites entreprises.

Mais les tâches qui, aux termes des nouvelles lois de sécurité de l'emploi, sont confiées aux représentants des salariés, par ex. le travail dans les groupes d'adaptation, sont également embrassées par la Loi sur les représentants au même titre que le rôle élargi concernant l'information et l'organisation de l'éducation des adultes au sein des salariés.

Pour le délégué à la sécurité s'appliquent les règles correspondantes de la Loi sur la sécurité du travail.

Quant aux activités politiques et autres activités analogues pouvant être supportées par une organisation syndicale, elles ne sont pas réglementées par la Loi sur les représentants syndicaux.

Sécurité d'emploi du délégué syndical

En matière de licenciement, etc. s'appliquent en premier lieu les dispositions de la Loi sur la sécurité de l'emploi. Le licenciement d'un salarié pour cause d'activité syndicale constie en outre une atteinte à la liberté d'association.

Le délégué syndical ne doit pas souffrir d'une détérioration des conditions de travail et d'emploi par suite de la mission qui lui est confiée. Par conséquent si, pour l'accomplissement de son travail syndical, il lui faut être affecté à un autre poste, il a droit au maintien des avantages salariaux acquis. Avant le changement d'affectation, l'employeur doit en général donner un préavis et s'entretenir en la matière avec l'organisation concernée.

Une position identique ou équivalente est assurée au délégué après accomplissement de sa mission syndicale, comme s'il n'avait pas été délégué. Aucun salarié ne doit par conséquent subir de préjudice pour s'être chargé d'une telle mission.

La protection des activités syndicales

Le délégué syndical ne doit pas être entravé dans sa mission syndicale par le fait de l'employeur. Cela signifie qu'il n'a pas seulement le droit d'accéder aux différents services ou ateliers du lieu de travail, le droit de parler avec les employés, etc. mais aussi que l'employeur a le devoir de faciliter organisatoirement l'activité syndicale.

L'occasion de disposer d'un local ou autre espace sur le lieu de travail doit être donnée au délégué pour pouvoir mener à bien son travail syndical.

En cas de réduction d'activité, le représentant syndical bénéficie d'une priorité au maintien de son emploi dans l'entreprise si ce maintien revêt une importance particulière pour l'activité syndicale. C'est l'organisation syndicale qui décide si cette règle doit être appliquée. Le licenciement opéré en contradiction avec la décision syndicale pourra être invalidé.

Les règles de congé

Le délégué a droit au congé nécessaire à l'accomplissement de ses fonctions syndicales.

Mais la libération de ses tâches ordinaires ne doit pas revêtir une ampleur supérieure à ce qui est raisonnable compte tenu des conditions existant sur le lieu de travail. On considérera à cet effet le besoin variable d'activité syndicale et les moyens d'accorder un congé, par ex. la possibilité de disposer d'un remplaçant.

Le congé devra être aménagé de façon à ne pas perturber outre mesure la marche requise du travail.

L'importance et la date du congé seront fixées après consultations entre l'employeur et l'organisation syndicale locale. L'importance et la date du travail syndical courant sont généralement déterminées par les conventions collectives.

Pendant le congé au cours duquel le délégué se livre aux activités syndicales dans l'entreprise, il a droit au maintien des avantages salariaux acquis. Par conséquent, l'activité relative au lieu de travail qui l'emploie est effectuée pendant les horaires payés. Cette disposition s'applique aussi aux cours concernant les questions syndicales ayant une importance directe pour les conditions existant sur le lieu considéré. Les règles concernant ce type de congé payé peuvent être remplacées ou complétées par d'autres règles fixées par les conventions collectives.

La priorité d'interprétation et autres règles en cas de litige

En cas de litige survenu à l'occasion de l'interprétation de la loi ou des dispositions conventionnelles qui la remplacent,

c'est l'avis de l'organisation syndicale qui prévaut jusqu'à ce que le litige ait été tranché par la Cour du travail. L'organisation bénéficie de ce qu'on appelle la priorité d'interprétation.

L'employeur toutefois, en cas de litige sur la date ou la disposition du congé, peut s'opposer à ce dernier s'il menace la sécurité dans l'entreprise, d'importantes fonctions d'intérêt public ou autres intérêts de même caractère.

Si l'organisation syndicale abuse de sa priorité d'interprétation, il peut lui être enjoint de verser des dommages-intérêts à l'employeur. Le délégué par contre n'est frappé d'aucune sanction s'il a agi avec l'approbation de l'organisation.

Si l'employeur néglige les obligations qui découlent de la loi, il peut lui être enjoint de verser une indemnité aussi bien au délégué qu'à l'organisation.

L'action en dommages-intérêts est assortie de certains délais.

Les procès sur la Loi relative aux représentants syndicaux sont de la compétence de la Cour du travail. Ils doivent être instruits dans les plus brefs délais. Les questions concernant l'application de la priorité d'interprétation doivent être traitées avec une célérité particulière.

Entrée en vigueur

La Loi sur les représentants syndicaux s'applique à partir du 1er juillet 1974, mettant fin en même temps à certaines dispositions antérieures concernant les délégués syndicaux.

LA LOI SUR LA PROCEDURE DES LITIGES DU TRAVAIL

Domaine d'application

La loi s'applique en principe à tous les litiges concernant les relations employeurs-employés. Elle régit aussi bien les instances où les parties en présence sont des organisations, par ex. les procès sur les conventions collectives ou les mesures

de combat, que les différends impliquant un employeur et un salarié particuliers, par ex. les litiges nés à l'occasion d'un licenciement ou d'une revendication de salaire.

Les procès relatifs à un accident du travail, à la situation née de la faillite, entre autres, font exception en ce qu'ils sont généralement instruits et jugés par les tribunaux de droit commun.

Le secteur public connaît également, dans certains cas, des règles spéciales, ainsi en ce qui concerne l'appel.

Les tribunaux

Les litiges mettant en présence les grandes organisations du marché du travail ainsi que les salariés syndiqués sont directement instruits et jugés par la Cour du travail, qui constitue alors la première et seule instance. Il n'est pas nécessaire d'ailleurs que les parties soient liées par des conventions collectives. Même un salarié qui engage l'action sans l'appui de son organisation doit s'adresser directement à la Cour du travail.

Les litiges impliquant un salarié non syndiqué sont d'abord portés devant le tribunal de première instance. La sentence de celui-ci pourra être attaquée devant la Cour du travail, qui constitue dans ce cas la dernière instance. La règle est que c'est le tribunal de première instance du domicile du salarié qui est compétent. Si l'action est engagée devant le mauvais tribunal, elle sera renvoyée devant le tribunal habilité pour en connaître.

Les sentences de la Cour du travail ne peuvent pas être attaquées en appel.

Le siège de la Cour du travail est à Stockholm. Les grandes organisations du marché du travail font partie des membres de la Cour. Devant le tribunal de première instance du droit commun, les litiges de travail sont jugés par trois juges, sans l'assistance d'un jury.

La procédure judiciaire

Les règles sont en principe les mêmes que pour d'autres litiges. Mais certaines dispositions particulières existent cependant.

Lorsqu'il s'agit d'une partie syndiquée, c'est l'organisation qui, en premier lieu, plaide devant la Cour du travail pour le compte de son affilié. Un salarié ne défendra sa propre cause que si son organisation s'y refuse.

En règle générale, des négociations à l'échelon local aussi bien que central doivent avoir lieu avant que les litiges des parties organisées ne soient portés devant la Cour du travail.

Dans le cas de l'appel d'un jugement concernant un salarié non syndiqué, la Cour du travail peut dans certains cas trancher sur le vu des dossiers, c.-à-d. sans que les parties soient astreintes à comparaître.

Certaines instances doivent être instruites en priorité, par ex. les litiges relatifs à un licenciement ou à des mesures de combat en cours.

Une procédure simplifiée, par laquelle les tribunaux doivent notamment aider les parties à trouver une solution, peut s'appliquer à certains différends concernant des revendications de salaire jusqu'à 3.950 couronnes. Ces dispositions visent surtout les salariés non syndiqués et ne s'étendent pas, par ex., aux licenciements.

Le secteur public

Certains litiges du secteur public, ainsi ceux nés à l'occasion d'un licenciement ou d'une revendication de traitement, sont tranchés par la Cour du travail ou le tribunal de première instance, tout comme les autres litiges de travail.

D'autres, par ex. ceux qui concernent l'avancement ou les nominations, les mesures disciplinaires, les pensions, etc. sont instruits et tranchés par le gouvernement, ou par le tribunal administratif après appel. Les litiges concernant la faute dans le service sont jugés par les tribunaux de droit commun.

Procédure d'arbitrage

La loi autorise que les litiges de travail soient réglés par une commission d'arbitrage au lieu de la Cour du travail ou du tribunal de droit commun. De telles commissions d'arbitrage ont été instituées dans certaines branches.

Pour pouvoir être examiné par une commission d'arbitrage, le litige ne devra pas avoir fait l'objet d'une action engagée auprès d'un tribunal.

Entrée en vigueur

La loi s'applique à partir du 1er juillet 1974. Les dispositions antérieures sont applicables aux procédures introduites avant cette date. Les nouvelles règles sur les litiges de travail du secteur public ne concernent pas les décisions prononcées avant le 1er juillet 1974.

AUTRES SOURCES LEGALES ET CONVENTIONNELLES

Dans le domaine du droit du travail, d'autres lois remplacent ou complètent la nouvelle législation. Il en est de même des conventions collectives conclues par les partenaires sociaux.

La Loi sur la sécurité de l'emploi est complétée par des règles d'interdiction de licenciement en raison d'appel sous les drapeaux, de mariage, grossesse, etc. Des dispositions spéciales de licenciement sont prévues pour les employés domestiques, les marins, entre autres. Pour les fonctionnaires de l'Etat, on a conservé des règles qui offrent une garantie d'emploi particulière.

Parallèlement à la Loi sur les représentants syndicaux, il convient de mentionner les dispositions de la Loi sur le droit d'association et de négociation ainsi que la Loi sur la sécurité du travail.

Parmi les conventions collectives, on citera avant tout celles qui établissent les règles de concertation en cas de rationalisations, etc., les conventions dites de sécurité du secteur des employés et fonctionnaires, de même que les conventions sur les indemnités de départ.

Finalement, il y a lieu de mentionner les différentes mesures prises par le Pouvoir central en matière de politique de l'emploi, notamment celles qui visent la main-d'oeuvre âgée et la main-d'oeuvre à capacité de travail réduite. Les agences de l'emploi fourniront à ce sujet des informations plus précises.

TRAVAUX PREPARATOIRES, REFERENCES, ETC.

Loi sur la sécurité de l'emploi

texte de loi : SFS 1974:12, 367 et 378
travaux préparatoires : SOU 1973:7, 1973:56
prop. 1973:129, 1974:77 et 88
InU 1973:36, 1974:14, 15 et 16

Loi sur certaines mesures de promotion de l'emploi

texte de loi : SFS 1974:13 et 368
travaux préparatoires : SOU 1973:7
prop. 1973:129
InU 1973:36

Loi sur la situation du représentant syndical dans l'entreprise

texte de loi : SFS 1974:358
travaux préparatoires : SOU 1973:56
prop. 1974:88
InU 1974:15

Loi sur la procédure des litiges du travail

texte de loi : SFS 1974:371
travaux préparatoires : SOU 1974:8
prop. 1974:77
InU 1974:16

Le Recueil des lois de Suède (SFS) et les Commissions officielles de l'Etat (SOU) peuvent être commandés à Allmänna förlaget, Fack, 16210 Vällingby, tél.(08) 890120. Les projets de loi (prop.) et les rapports de la commission du travail et du logement (InU) peuvent être obtenus à l'Imprimerie du Parlement : Riksdagens tryckeriexpedition, Fack, 10012 Stockholm, tél.(08)108459.

Autres matériaux d'information

La plupart des grandes organisations ont elles-mêmes publié des brochures ou des circulaires. Celles-ci rendent souvent compte

des règles particulières à une certaine branche. Le secteur public a ses instructions propres. La Direction du travail a édicté une circulaire sur l'application de la Loi sur les mesures de promotion. Chez les libraires, finalement, on trouvera des commentaires à certaines des nouvelles lois.

DEPARTEMENTENS OFFSETCENTRAL
Stockholm 1975

NEWSLETTER

National Board of Occupational Safety and Health · Arbetarskyddsstyrelsen · Sweden
Mailing address: Fack, S–100 26 Stockholm · Telephone: 46-8-54 02 60 Publisher: Gunilla Warnbeck

No. 2 April 1976

FINAL REPORT OF THE WORK ENVIRONMENT COMMISSION OUTLINES A COMPLETELY NEW CODE OF OCCUPATIONAL SAFETY LEGISLATION

The Work Environment Commission was appointed in 1970. Its chairman was the director general of the National Board of Occupational Safety and Health (Arbetarskyddsstyrelsen), and the Commission included representatives of the trade unions and employers' associations together with a number of advisers.

The Commission in January this year presented its final report to the Government. After it has been circulated to the relevant organizations and authorities for comment, the report is intended to form the basis of a Bill to Parliament.

In the final report the Commission outlines a completely new code of occupational safety legislation. The new Work Environment Act thus proposed defines the fundamental requirements applying to working conditions and covers measures for the prevention of every variety of health and safety hazard relating to the working environment. The Work Environment Act will override all other legislation in these respects.

The essential aim of the new Act is to afford protection against health hazards and accident risks. But the Act also sets out to do more than protect workers against certain negative phenomena endangering health and security. In keeping with the broader view which is now taken of the working environment, the proposal is also founded on the aim of establishing working conditions in which the individual can experience his work as a meaningful and rewarding part of his life.

The Work Environment Act gives a rough outline of the means whereby these ends are to be achieved, and it defines the liabilities, obligations and rights involved.

One important section of the Act concerns co-operation between employer and employee. This section contains regulations concerning the organization of safety arrangements within the firm. Considerable emphasis is placed here on the participation of employees in the shaping of their work environment, but attention is also drawn to the role of public

authorities in furnishing guidance and intervening when necessary to ensure that the legislation serves its purpose. The National Board of Occupational Safety and Health and the Labour Inspectorate (Yrkesinspektionen) are invested with far greater powers to issue regulations, supervise the implementation of the Act and intervene at particular work places.

In an interim report published in 1972 the Commission proposed among other things that new regulations should be introduced with a view to strengthening the influence exerted by employees on the design of their work places. A special call was made for an increase of the powers of safety delegates and safety committees. The appointment of regional safety delegates was one of the important new ideas put forward with smaller work places in mind.

The provisions added to the existing Worker's Protection Act in response to the proposals in the interim report with effect from January 1, 1974 have to all intents and purposes been incorporated in the proposed new legislation, through certain alterations and additions have been made in the light of subsequent experience.

Otherwise most of the Act represents a completely new order of things as compared to the Worker's Protection Act. The general validity of the legislation is further underlined by an expansion of its applicability, e.g. in the armed forces, in education, in family agricultural enterprises and with regard to self-employed persons.

The proposed Work Environment Act is essentially of an outline character, which means that the material content of its rules concerning the state of the working environment and the enforcement measures to be taken will very much depend on the regulations which the National Board of Occupational Safety and Health will be empowered to issue concerning the implementation of the Act. The proposed Act and the accompanying Work Environment Ordinance contain a number of provisions empowering the Board, in close co-operation with trade unions and employers' associations, to issue detailed regulations in various points.

Within the framework of the new Act, it will be possible for requirements concerning the working environment to be stepped up in keeping with social and technological developments in the community generally. The successive publication of regulations by the Board will lead to a closer definition of requirements and the establishment of a more reliable basis for safety work. Many of the penal sanctions proposed refer to infringements of these regulations. Otherwise the system of sanctions is based on the existing rules concerning the issue or orders and prohibitions to negligent employers.

The new legislation will demand a considerable increase in the resources at the disposal of the occupational safety authorities. The Commission therefore advocates a continuation of the present rapid expansion of personnel and facilities. This recommendation is made in the full realization that the demands and expectations attaching to the new legislation cannot be fulfilled otherwise.

It is proposed that the new legislation be made effective as from January 1, 1978.

-Excerpt from the English summary of the final report.-
The whole summary (18 pages) which also gives a more systematic description of the Commission's proposals, can be ordered from the Board. See order form.

NEW DIRECTIONS OF THE BOARD

Noise

The Board's general directions for the prevention of injury or disease due to exposure to noise in work places - **Directions No. 110 Noise at work** - will come into force on 1st July,1976.

In these directions it is emphasized, by way of introduction, that noise can cause illness at far lower sound levels than are required for permanent hearing damage. The directions state by way of a general rule that noise on work premises must be kept to a level which is acceptable in relation to the type of activities concerned. Employers must systematically test the use or introduction of working methods for low noise emission. Even in adverse conditions, the acoustic planning of activities in connection, for example, with the building, alteration or enlargement of work premises must be aimed at keeping the noise to which workers are exposed during a typical working day below an equivalent sound level of 85 dB (A). If the noise level at a work place exceeds this figure, a systematic noise abatement campaign is to be mounted by the employer in consultation with the workers. It is recommended that workers be given the opportunity of hearing tests including tone audiometry in connection with their engagement or transfer to new duties. Periodic hearing tests are also recommended in connection with work involving a risk of hearing damage.

Microwave ovens

The Board's directions concerning the approval and inspection of microwave ovens with respect to microwave leakage - **Notice No. 1976:10 Microwave ovens** - will come into force on 1st July, 1976, (In the case of designs previously approved under a special testing procedure, the design and approval requirement will not come into force until 1st July, 1977).

The Notice provides that newly manufactured microwave ovens must be of a design approved by the Board with respect to the prevention of microwave leakage. Testing requirements are based on work done within the International Electrochemical Commission (IEC). In order for a design to be approved, microwave leakages measured at a distance of 5 cm or more from a charged oven must not exceed 5 mW/cm^2. Employers must ensure that microwave ovens in use are regulary checked for microwave leakage. Ovens of nonapproved design must be checked in this respect once annually. Ovens of approved design are to be checked at least once every three years. The microwave leakage thus measured must not exceed 5 mW/cm^2 at a distance of 5 cm or more from the oven.

Asbestos

The following directions concerning asbestos have been published by the Board since the previous issue of Newsletter.

Notice No. 1975:23 Crocidolite (blue asbestos), according to which crocidolite, material containing crocidolite or equipment of which crocidolite or material containing crocidolite is a part may not be used in working life.

Notice No. 1975:24 Notification of work with asbestos

Notice No. 1975:28 Respiratory apparatus during work with asbestos

Notice No. 1975:29 Spraying with asbestos, interpreting paragraph 18 of the **Directions no. 52 Asbestos** as meaning that spraying with asbestos or material containing asbestos may not occur for insulating purposes, underbody coating, in construction work etc. and limiting in time the right of the Labour Inspectorate to make exemptions from the **Directions No 52** when it comes to spraying.

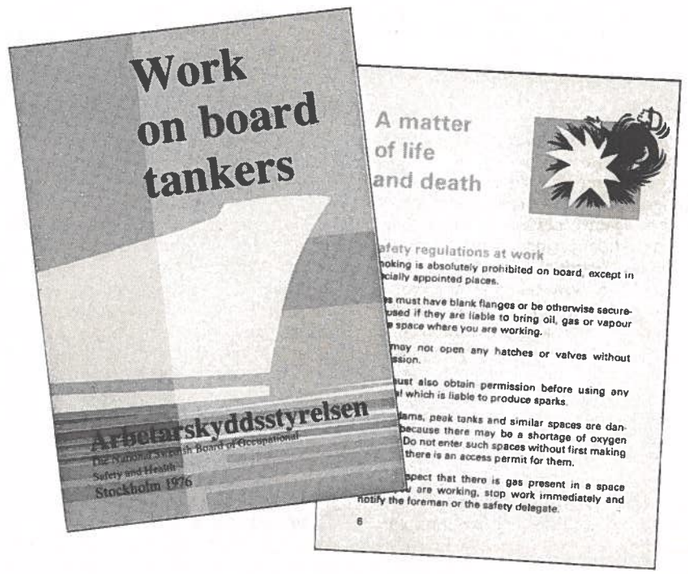
Notice No. 1976:5 The use of mats with asbestos backing,according to which employees may not install such mats. Effective Jan. 1977.

Notice No. 1976:7 Asbestos in paint, glue, putty, jointing materials etc, according to which such products may not be used in working life after 1976.

Notice No. 1976:8 The use of asbestos cement products, according to which employees may not execute work involving new installations of asbestos cement products. Effective June 1976 with certain exceptions during a transitional period.

Notice No. 1976:9 Revision of the limit value for asbestos, lowering the value from 2 fibres/ml to 1 fibre/ml. Effective July 1976.

Single copies of the publications of the Board mentioned in this Newsletter are submitted free of charge to foreign addresses on request. See order form.



Summaries of the Board's directions

In 1975 the Board started issuing summaries of certain of its directions. The summaries are in the first place intended for the workers. Some of these versions have been or will be translated into the main immigration languages. In addition an English summary has been made of four of the Board's shipyard directions i.e. directions No. 19:1 Oil tankers, No 19:2 Gas tankers, No 19:3 Chemical tankers and 19:6 Inert gas - **Summary directions No. ADI 42 Work on board tankers.**

Other directions published by the Board since the previous issue of Newsletter.

Directions No. 53:1 Central tray laying and central dish washing. Directions concerning safety conditions in connection with central tray laying and central dish washing in hospitals.

Directions No. 106 Plastic receptacles for dangerous liquids. Directions concerning safety precautions for the carriage and storage of dangerous liquids in certain plastic receptacles.

Directions No. 107 The automotive industry. Directions for the prevention of accidents and injury during work in garages and other service facilities in the automotive industry.

Directions No. 108 Reinforced ester plastic. Directions and regulations for the prevention of accidents and injury during work involving the use of reinforced ester plastic.

Directions No. 109 Nailing machines. Directions concerning safety precautions to be observed by suppliers and users of pneumatic fastening tools.

Notice No. 1976:1 Blaster's licenses from the National Board of Occupational Safety and Health.

Notice No. 1976:2 Carbonless paper

Notice No. 1976:3 Supervision of eccentric press control valves

Notice No. 1976:6 The inspection and repair of tractor cabs.

Notice No. 1976:11 Inspection and testing of pressure vessels, lifting devices, conveyors and hoisting gear

Notice No. 1976:12 Noise measurement for combine harvesters

Notice No. 1976:13 Safety precautions during sand blasting

Please note that all the directions mentioned in this issue are published in Swedish only.

NEW ISSUES OF "ARBETE OCH HÄLSA"

The Board's scientific series "Arbete och hälsa" contain results of the research carried out within the Board's Occupational Health Department. As a rule the issues appear in Swedish with a summary in English

Summaries of the latest issues follow below.

Arbete och hälsa 1975:12

Ingvar Skare:
Evaluation of the reliability of certain indicator tubes. I. Working plan. Oxygen. Ammonia.

This report is the first one in a series concerning evaluation of indicator tubes as analytical tools for measuring gas concentrations at occupational hygiene investigations.

In the present report the working plan is presented. It involves controlled laboratory tests of tubes for about 15 common gaseous pollutants with wet chemical methods as references. For each pollutant different types of indicator tubes available on the Swedish market are to be tested. The final results of the tests on the oxygen and ammonia tubes are published.

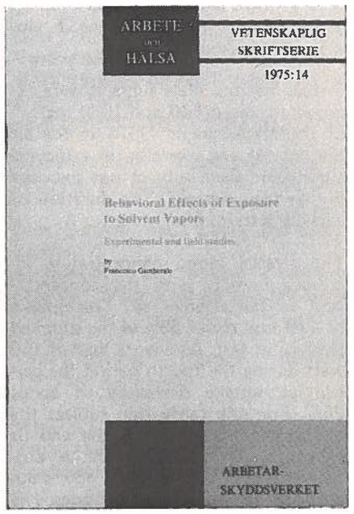
Arbete och hälsa 1975:13

Ann-Sofie Kindblom and Ingvar Holmér:
Breathing resistance during work with filter respirators.

Twelve men performed exercise on a bicycle ergometer for 45 minutes at work intensities of both 50 W and 100 W. During the exercise they breathed alternately through a valve (15 min), through a mask plus filter with low breathing resistance (filter 1, 15 min) and through a mask plus filter with high breathing resistance (filter 2, 15 min). Inhalation time was significantly shorter than exhalation time under all test conditions. Inhalation time was furthermore slightly longer for the filter with the highest breathing resistance. Frequency of breathing was significantly higher, and tidal volume and mean carbon dioxide level lower, when breathing through the valve as compared to through filter 1 and filter 2. Heart rate, oxygen uptake and ventilation were not affected by increased breathing resistance.

The degree of perceived breathing resistance increased with increasing breathing resistance, and the effect was reinforced by the increment in work intensity. The maximum pressure and mean pressure during both inhalation and exhalation were greater with filter 1 than with the valve, and were greatest with filter 2 under all test conditions.

For moderately heavy work with a pulmonary ventilation of approx. 40 l/min, using a respirator with a breathing resistance of 250-300 Pa per l/s (corresponding to filter 2), a maximum duration of 1 hour's worktime without a break should be acceptable. When breathing masks are to be used, attention should also be paid to the considerable individual variation in inhalation resistance, approx. 20% at a ventilation of 40 l/min, which is caused primarily by differences in breathing pattern.



Arbete och hälsa 1975:14

Francesco Gamberale:
Behavioral effects of exposure to solvent vapors. Experimental and field studies. In English.

The studies were aimed at a systematic investigation and a quantitative evaluation of the acute effects on the central nervous system of exposure to organic solvents.

The experimental studies were performed in controlled and systematically varied conditions involving the exposure of the subjects to various concentrations of the organic solvents toluene, methyl chloroform, styrene, white spirit and methylene chloride. During exposure and under reference conditions, measurements were taken of, among other things, the subjects' performance in a number of psychomotor, perceptual and cognitive tests. Changes in the level of performance during exposure compared with performance under reference conditions were used as an indicator of effects on central nervous functions. Field studies mainly comprised tests of the psychomotor reactions of occupationally exposed subjects and matching unexposed reference groups. All groups were tested before and after a working day and in the immediate vicinity of their places of work.

The experimental studies revealed unequivocal relations between reduced performance and the solvent content of respiratory air. Some of the solvents investigated had a negative influence on performance after only short periods of exposure and at concentrations corresponding to the Swedish threshold limit values of the various substances in effect at that time. The field studies established connections between performance in psychomotor tests and occupational exposure.

Arbete och hälsa 1975:15

Irma Åstrand and Per Övrum:
Exposure to trichloroethylene. I. Uptake and distribution in man.

Fifteen healthy male subjects were exposed to about 540 and 1080 mg/m^3 of trichloroethylene (TRI) in the air during rest and exercise on a bicycle ergometer. Each subject was exposed during four periods. The duration of each period was 30 minutes.

The arterial blood concentration increased linearly with the concentration in the alveolar air. The uptake of TRI was about 55% of the supplied amount at rest. At a work load of 150 watt during the fourth period the percentage uptake decreased to about 25%. For one fairly thin subject the uptake was near zero at the end of exposure. This development is probably due to the relatively low solubility of TRI in blood and tissues. The uptake of TRI might be estimated from pulmonary ventilation and concentration in alveolar and inspiratory air.

Olov Vesterberg, Jadwiga Gorczak and Mudite Krasts:
Exposure to trichloroethylene. II. Metabolites in blood and urine.

Fifteen men were exposed to trichloroethylene (TRI) in three different ways with regard to the concentration of TRI in air as well as exercise on a bicycle ergometer. The total amount of TRI supplied and taken up by each person was measured. The concentrations of trichloroethanol (TCE) and trichloroacetic acid (TCA) were determined in blood and urine. In spite of large differences in uptake, there were small differences in the concentration of TCA in blood during the day of exposure. There was a large scatter for the values of TCA in urine within each group.

The concentration of TCE in arterial blood increased during exposure. Thereafter the concentrations were almost constant during two hours and differed among the groups. This can be interpreted as being due to balancing rates of formation and elimination of TCE. The levels mentioned were related to the uptake of TRI. This was also true for the rate of excretion of TCE in urine if calculations were made on the morning sample obtained the day after exposure. TCE is the most potent substance when the effects on the central nervous system are considered. If the concentration of TCE in blood exceeds a certain level, the risk for accidents can be expected to increase.

Francesco Gamberale, Görel Annwall and Birgitta Anshelm-Olsson:
Exposure to trichloroethylene. III. Psychological function.

The effect of exposure to the solvent trichloroethylene (TRI) on performance of tests of numerical ability, reaction time (simple and choice) and short-term memory were studied in fifteen healthy male subjects. The subjects were tested individually on three different occasions during exposure to 540 and 1080 mg/m^3 TRI in inspiratory air and under control conditions, respectively. At predetermined times during the three 70 min exposure periods, samples were taken of the subjects' alveolar air.

Neither the reaction time tests nor the short-term memory test showed any signs of performance decrement during exposure to TRI as compared to under control conditions. However, a statistically significant decrement in performance was obtained on the test of numerical ability during exposure to TRI. The results as a whole indicate that there should not be any risk of an acute effect on central nervous functions at concentrations which do not considerably exceed the Swedish threshold limit value for the solvent (160 mg/m^3).

Arbete och hälsa 1976:1

Staffan Krantz and Jan Scullman:
Infrared analysis of quartz.

The investigation includes a theoretical part and an experimental part, concerning infrared analysis of quartz dust. In the experimental work, nine groups of pure quartz dust samples have been studied with reference to particle size distribution. The results show that due to extreme differences in particle size distribution ($< 1\ \mu m$ compared with 4-5 μm), the result of the quartz analysis can vary with 50%. Differences in the particle size distribution in the fraction<5 um can give rise to deviations up to 20%. However, in industry differences in particle size distribution within the respirable fraction are negligible, which means that deviations from 100 % due to particle size distribution don't effect the evaluation of the occupational risk. The investigation also shows that a suitable standard quartz ought to have a high absorbance at a non-extreme particle size distribution. Moreover 45 industrial dust samples from different industries have been analysed with IR-technique and the results have been compared with x-ray diffraction analyses. This shows that there is a good correlation between results from IR-spectroscopy and x-ray diffraction although for some industrial dust differences have been observed.

Arbete och hälsa 1976:2

Lars Olander and Staffan Krantz:
A method for testing the capture degree of local exhaust systems.

A method for testing the efficiency of local exhaust systems has been developed. For testing the method 4 different manual grinding machines with local exhaust hoods have been used on three different materials, iron, plastic and concrete. The conditions which ordinarily cause variation during concentration measurements at particle generating processes have been controlled during these tests.

A particle counter (Royco 225) was used for the dust measurements. For the evaluation a mathematical expression, which describes the capture degree of the local exhaust system has been used.

Arbete och hälsa 1976:3

Irma Åstrand and Francesco Gamberale:
Effects on human beings of solvents in the inspiratory air.
A new method for estimation of uptake.

A new method is introduced for estimation of uptake in the body through the respiration of gaseous materials in the ambient air. The usefulness of the method when producing the basis for the threshold limit values is discussed. Proposals for biological limit values of a number of solvents are given. The values are calculated with the aid of the method.

Arbete och hälsa 1976:4

Birgitta Kolmodin-Hedman, Marianne Håkansson, Ester Randma, Bengt Sjögren and Åke Swensson:
Aspects of occupational medicine for the control of workers treating and planting pine and fir trees with lindane.

Six persons treated pine and fir plants with an emulsion containing 1 per cent of lindane. Ten persons packed these plants for two days in-doors. The plasma levels of lindane after treatment were 1.9-5.6 ng/ml and after packing for two days 1.2-25.7 ng/ml. Plasma levels of lindane, followed after exposure decreased to half the initial values in 3-5 days. Planting resulted in plasma levels of lindane $<$ 0.2-22.3 ng/ml at the end of the first week. Despite further planting the lindane levels decreased to $<$ 0.2-3.5 ng/ml at the end of the second week.

Symptoms were not registered in higher frequency in a group of planters exposed to lindane compared to a group of planters who worked with unprepared plants. Symptoms were not correlated to high plasma levels of lindane.

OTHER NEW REPORTS PUBLISHED BY THE BOARD

The Board also publishes reports on methods, investigations, commissioned research work and training. The reports presented below exist in Swedish only. Two of them contain summaries in English which are reproduced in extenso.

Methods report 009/75, 16 pages

Jan-Erik Hansson, Mats Bjurvald, Martin Friberg, Lars Klusell and Hans Nilsson.
Description of certain work demands.

In recent years, the Work Physiology Unit, at the National Board of Occupational Safety and Health, in collaboration with the Labour Market Board, has been involved in projects dealing with the adaptation of work and the assignment of people with reduced work capacity to suitable jobs.

A system for describing certain work demands without specialist knowledge is described. Views are also provided on training in conjunction with the use of the work description. The "adjustment teams" [1] already in existence in many companies are recommended as the most suitable units for dealing with adaptation work.

The system is recommended for main use when efforts are being made to find new jobs or improve existing jobs. The proposed system can also be used to perform a broad survey of the environment in a company.

The system for the description of certain work requirements and the proposed method for training have been successfully tested at work sites in retail trade, wholesale trade, industry and state and borough administrations.

1)
The adjustment team is a co-operation body between the employer, the trade unions and the employment office.

The adjustment team shall

- work for a more positive attitude in working life towards older and handicapped workers
- propose measures facilitating the employment of older and handicapped workers and
- propose measures to help older and handicapped workers to remain in employment.

Methods report AMTG 108/75, 22 pages.

Ingvar Skare:
G2 - II. Nitrogen dioxide - manual methods.

Investigation report AMA 010/75, 30 pages

Martin Friberg and Hans Nilsson:
Personal protective equipment in forestry work: An ergonomic study.

A field study of the ergonomic design of personal protective equipment in forestry work was carried out among 40 cutters. Furthermore, some aspects of eye protective nets, and of pads for protection against saw cuts to the legs were studied in the laboratory.

It was found that the air temperature in the safety helmet was on average 30-33° C, at outside air temperatures of 22-26° C during work in the shade. In winter, at an outside air temperature of -2,0° C±3,1, the air temperature in the helmet was 5,2°C±1,9. A white helmet with better ventilation would probably reduce the heat load in the summer. The distance between the helmet shell and the head tended to covary with the cutters' opinions on the helmet's fixation and fit. The distance was shorter among satisfied cutters. A new interior fitting reaching further down the neck would probably steady the helmet better onto head during cutting operations.

Skin temperature under the ear seals of the ear muffs showed daily averages from 32°C to 36°C for different cutters at outside air temperatures of 16°C to 26°C. The highest observed skin temperature was 36,9°C. The mean pressure of the studied ear muffs onto the head was 22,1±6,2 N, with the pressure of some ear muffs exceeding 30 N. Optimum pressure against the head should be determined.

The eye protective nets worn by the cutters reduced the amount of light transmitted by 32-45%. The most commonly used net types had a mesh dimension of approximately 1,7 mm. It was found that an increase in mesh dimension which gives a real improvement in light transmission cannot be recommended due to the impaired protective effect.

The bending resistance was studied of leg protective pads made of charmeuse nylon, nylon cord, fibre weave and fibre fur. It was found that the bending resistance of pads made of nylon cord was 5 times as great as that of either fibre fur or 18-20 layers of charmeuse nylon. Maximally tolerated bending resistance should be determined.

In interviews, forestry safety engineers especially stressed the need for lighter protective equipment as well as lighter working tools. They also critisized the power saw on many points.

Investigation report AMMF 101/76, 50 pages.

Olov Östberg, Dag Holmgren and Ewa Gunnarsson:
Work stations for CRT visual display units - a survey

Investigation report AMMF 102/76, 52 pages.

Olov Östberg, Mats Levin and Bengt Knave:
Assessments of optical radiation hazards - plasma arc jet and UV-lamp

Investigation report AMMF 103/76, 44 pages

Mats Levin, Olov Östberg, Bengt Knave and Allan Ottosson:
Assessments of optical radiation hazards - plasma arc cutting machines

Investigation report AMMT 103/75, 71 pages

Jan-Olof Säfwenberg and Bo Holmberg:
Qualitative and quantitative aspects on chemical carcinogenesis

Investigation report TK 1/76, 12 pages

Ulf Bruder and Arne Stråby:
Vinyle chloride exposure in the PVC-processing industry.

A report from an investigation made in cooperation between The Swedish Plastics Federation and The National Board of Occupational Safety and Health.

Training report 004/75, 122 pages.

Carcinogenic substances in working life.

Reviewing papers from the VI Nordic Occupational Health Congress, May 1974, Stockholm.

NEW RESEARCH PROJECTS OF THE BOARD

The latest annual list of research projects in progress at the Occupational Health Department of the Board has just appeared and can be obtained from the Board. See order form.

THE NORDIC COMMITTEE OF OFFICIALS FOR QUESTIONS CONCERNING THE WORKING ENVIRONMENT

The Nordic Committee of Ministers is a joint body of the five Nordic Governments. This Committee should not be confused with the Nordic Council, which is responsible for co-operation between the Nordic countries at parliamentary level.

Co-operation through the medium of the Committee of Ministers covers practically all sectors of society. The most important sectors are covered by committees of officials, whose task is to draft business for the meetings of the Committee of Ministers and to direct the investigatory work on which the Committee's decisions are based. The various committees are aided by a Secretariat, established in 1973 and situated in Oslo, which at present employs some 35 persons. There is also a Secretariat for Cultural Co-operation in Copenhagen.

One of the fourteen committees of officials is **the Nordic Committee of Officials for Questions concerning the Working Environment.** This Committee started work in June 1973 The members of the Committee comprise one representative of each of the relevant authorities - ministry, occupational safety authority and institute of occupational health - in the Nordic countries. In Sweden's case this means that the National Board of Occupational Safety and Health has two representatives on the Committee, because the Institute of Occupational Health was incorporated by the Board in 1972 and now constitutes the Board's Occupational Health Department.

The latest meetings of the Committee were held on 12th-13th March 1975 in Copenhagen and on 2nd-3rd September 1975 in Gothenburg. The next meeting is expected to take places on 20th-21st May 1976 in Iceland.

The Committee's business includes the following:

an exchange of information concerning developments in the working environment sector in the various countries

co-ordination of the standpoints of the Nordic countries at extra-Nordic levels in matters concerning the working environment

streamlining of Nordic co-operation concerning occupational safety regulations

co-operation in the field of occupational health.

In May 1975 the Committee arranged in a conference of Nordic Ministers responsible for questions concerning the working environment.

Two working groups, the Steering Group for Occupational Safety Regulations and the Working Group for Occupational Health, have been set up under the auspices of the Committee of Officials for Questions concerning the Working Environment.

The main task of the Steering Group is to co-ordinate and effectivize the drafting of occupational safety regulations. This work covers all occupational safety regulations and implies the allocation between the Nordic countries of the drafting of different regulations. The documents thus produced are placed at the disposal of all the Nordic countries. The Steering Group is responsible for the implementation of the project entitled Joint Nordic Documentation concerning Occupational Safety Regulations which has been resolved on by the Nordic Committee of Ministers. In September 1975 a Documentation Centre was set up adjacent to and as an extension of the documentation service of the Danish Occupational Safety Authority. This Centre accepts orders from the Occupational Safety authorities of the Nordic countries for documentation concerning occupational safety regulations.

A seminar on the potentialities of future Nordic co-operation on matters concerning hygienic limit values was held during 1975 at the initiative of the Working Group for Occupational Health. A new seminar concerning these matters will be held during 1976. Also during 1975, a working session was arranged on response recording during exposure to solvents, and a conference was held on co-operation concerning the working environment in sawmills and the timber industry. Finally, a symposium held in 1975 dealt with the prospects for Nordic experimental activities concerning the psychosocial problems which come under the heading "stress in the working environment". Further consideration will be given to these matters during 1976.

The Scandinavian Journal of Work Environment and Health, which is an English-speaking Nordic journal, has received grants from the budget of the Nordic Committee of Ministers since 1974.

Change of address:

Write to

International Secretariat,

Arbetarskyddsstyrelsen,

National Board of

Occupational Safety

and Health,

Fack,

S-100 26 Stockholm,

Sweden.

ORDER FORM

To be sent to

National Board of Occupational Safety and Health
Arbetarskyddsstyrelsen
Publication Service
Fack
S-100 26 STOCKHOLM SWEDEN

Please send me the following material

The National Occupational Safety and Health Administration: a brief presentation

- ☐ English
- ☐ French
- ☐ German
- ☐ Finnish
- ☐ Swedish version.

- ☐ Swedish Workers' Protection Act and Ordinance. In English.
- ☐ Proposals for a new work environment legislation. Summary of the final report by the commission on the work environment. In English.
- ☐ Directions No .....
- ☐ Notice No .....
- ☐ Arbete och hälsa No .....
- ☐ Methods Report No .....
- ☐ Investigation Report No .....
- ☐ Training Report No .....
- ☐ List of publications and duplicated reports from the Board's Occupational Health Department. In English.
- ☐ List of research projects in progress at the Board's Occupational Health Department. In English.

Signature, name _____

Name of Institution _____

Address _____

_____

REPORTS FROM THE INSTITUTE OF APPLIED PSYCHOLOGY
THE UNIVERSITY OF STOCKHOLM

ANNUAL REPORT

V

1974

PUBLICATIONS IN INTERNATIONAL JOURNALS AND BOOKS

PAPERS PRESENTED AT INTERNATIONAL CONGRESSES

Borg, G. Psychological aspects of physical activities. In: L. A. Larsson (Ed.). Fitness, Health, and Work Capacity. International Standards for the Assessment. New York: MacMillan Publishing Co., Inc. 1974, 141-163.

The research program presented here is lead by Borg and concerns physical work, subjective effort, working capacity and physical performance. The chapter contains the following headings: Introduction, General Studies of Subjective Force and Perceived Exertion, Differential Studies of Perceived Exertion, A Bicycle Ergometer for Physiological and Psychological studies, Two Individually Adapted Performance Tests, A Study of the Transition from Short-Time Work to Prolonged Work, Work Motivation, Some Particular Aspects with Regard to Training, Self-Appraisal and Physical Fitness and The Relation between Physical Activation, Exertion, Working Capacity and Some Psychological Functions.

Borg, G., and Noble, B. J. Perceived exertion. In: J. Willmore (Ed.). Exercise and Sport Science Reviews, New York: Academic Press Inc. 1974, 2, 131-153.

A review is presented in the form of a chapter in a new international review series. The chapter summarizes the international research on perceived exertion. The chapter contains the following headings: Introduction, Psychophysical Studies of Work of Short Duration, Psychophysical Studies of Work of Longer Duration, Studies of Individual Differences, Estimates of Physical Working Capacity from Perceived Exertion, Clinical Studies, Psychophysiological Studies of Perceived Exertion, and Perceived Difficulty.

Dornic, S., and Borg, G. Perceived difficulty and mental work. Proceedings from the 18th International Congress of Applied Psychology, Montreal, 1974.

Difficulty of mental work is generally judged by performance only. However, performance criteria do not tell us much about the "subjective costs" responsible for a given level of achievement, i.e., the provide us with no adequate measures of perceived difficulty. Yet perceived (subjective) rather than "objective" difficulty is often decisive for man's satisfaction with work and life. Psychophysical methods employed in the investigations summarized in this paper yielded satisfactory measures of perceived difficult. In a series of experiments, perceived difficulty was studied in psychological testing, in different perceptual. attention and memory tasks, under conditions of time pressure, noise and distraction. Clear-cut interindividual dif-

ferences could be demonstrated in covert effort levels behind the same overt performance.

Metz, K.F., Borg, G., and Noble, B.J. A simple run test of physical working capacity. Proceedings from the 18th International Congress of Applied Psychology, Montreal, 1974.

The paper presents a variant of a simple run test of physical working capacity. An experimental study is reported, where the results of the run test are analyzed together with data from a 12-min-run and a tread-mill test.

Morgan, W.P., Borg, G., and Purvis, J. Prediction of maximal work capacity from sub-maximal ratings of perceived exertion and heart rate. Abstracts of the 21st Annual Meeting of the American College of Sports Medicine Knoxville, Tennessee, No. 1, 1974, 1.

The objectives of this investigation were to (1) compare the efficacy of ratings of perceived exertion (RPE) and heart rate (HR) obtained during sub-maximal work in predicting maximal work capacity (MWC); (2) compare perceptual and cardiac models for males anf females, as well as for bicycle and tread-mill tasks; and (3) evaluate the influence of repeated measures (3 trials) on RPE, HR, and MWC. RPE and HR were obtained throughout progressive test designed to measure MWC. The subjects consisted of 30 adult males and 30 adult females. A series of stepwise multiple regression analyses were performed using RPE, HR, and RPE-HR prediction models. Trend effects for all variables were evaluated with ANOVA for repeated measures. Multiple correlations (R) averaged .57 and .74 for HR and RPE models respectively. R´s based upon bicycle work averaged .67 and .75 for the HR and RPE models respectively, and R´s based upon treadmill work were .47 (HR) and .73 (RPE). Both models were accurate for females, with RPE (R = .80) being significantly better than HR (R = .68). Use of a combined RPE-HR model facilitated prediction. In general, RPE, HR and MWC did not change appreciably across trials, and therefore, it is concluded that one trial is sufficient where one is interested in predicting or measuring MWC. Also, it is concluded that perceptual ratings of work intensity tend to be somewhat better predictors of MWC than sub-maximal measures of heart rate.

Noble, B.J., Borg, G., Cafarelli, E.D., and Metz, K.F. Magnitude estimates of upper and lower body exertion during bicycle work. Proceedings from the 18th International Congress of Applied Psychology, Montreal, 1974.

A psychophysical study is reported on perceived exertion during work on a bicycle ergometer. The study concerns both the perception of exertion in the "upper" or "central" part of the body related to the cardiovascular-respiratory functioning, and the perception of exertion in the "lower" part related to "local" factors and leg strain. Power functions of the usual type with positive a-values (basic perceptual "noise" values) and with exponents between 1.1. and 1.7 are given to describe the perceptual variation with the variation in work load.

PAPERS PUBLISHED IN THE REPORTS FROM THE INSTITUTE OF APPLIED PSYCHOLOGY, THE UNIVERSITY OF STOCKHOLM

Borg, G. On a general scale of perceptive intensities. No. 55.

A general scale is proposed to enable intermodal and interindividual comparisons of perceptive intensities. The "maximal" perceptive intensity and the range to the maximum are set equal for all subjects and all modalities. The scaling method rests upon the notion of a maximal subjective intensity in one modality (e.g. the taste of sourness) as a reference intensity for all the others. By using a method of cross-modal estimates and calling the notion of the maximum for "100", simple percentage estimates can be obtained making possible direct interindividual comparisons of different perceptions. - A pilot study is presented, in which twenty subjects had to use this new estimation method to rate the degree of physical exertion, when working on a bicycle ergometer. The subjective estimate thus assessed were correlated with category ratings according to the "RPE-scale" and with heart rates. Significant positive correlations were then obtained giving support to the validity of the scale. A psychophysical function was also adjusted to the data, giving a power function with an exponent of 1.6, which corresponds to that previously found.

Bratfisch, O., and Larsson, T. Perception of occupations: Estimated difficulty and stated interest. No. 54.

Fifty senior high school students, 25 males and 25 females, with supposedly no real work experience were presented with 20 occupational titles and asked to estimate the difficulty of carrying out each profession by the method of pair comparison. In another part of the experiment they were asked to state, in the same way, their interest in the same 20 occupations. The two variables turned out to be by and large linearly related to each other, the coefficient of correlation being 0.84 and 0.49 for males and females respectively. When excluding 4 predominant male occupations from the data of the females the coefficient of correlation increased to 0.73. Thus, a sex-bias could be demonstrated. A high conformity between the males´ and females´ opinions about occupational difficulty (r = 0.96) and their stated interest in the occupations (r = 0.83) could be noticed. - The possible practical impacts of the result for vocational guidance are briefly discussed and future research on the topic is outlined.

Dornic, S., and Birbaumer, N. Information overload and perceived difficulty in "neurotics". No. 49.

An experiment was performed on the perception of difficulty of a task involving high information load. The subjects had to find out whether or not a series of complex visual items contained a given code. The experimental variable was the rate of presenta-

tation of the task i. e. the amount of "time-stress". Two groups of subjects were compared: the experimental group consisting of "neurotic" subjects, and a control group of "normal" subjects not having any symptoms of "neurotic" disorders. The results showed that in Control group, perceived difficulty was a linear function of the rate of presentation, while in Experimental group, preceived difficulty increased as a positively accelerated function of the time available to solve a task. Possible mechanisms of the results found are discussed.

Dornic, S., Sarnecki, M., Larsson, T., and Svensson, J. Ch. Performance and perceived difficulty: The effect of noise and distraction. No. 51.

The relation between performance and perceived difficulty was studied in four attention tasks involving high information load. The tasks were performed under three conditions: (1) in quiet, (2) in irregular, high intensity nonverbal noise, and (3) under the distraction of a conversation. The subjects (40 high school students) were able to compensate for the disturbing influences in Conditions 2 and 3 so that there was virtually no difference in performance between the three conditions. However, the "subjective costs" as measured by perceived difficulty showed considerable differences in effort necessary for the compensation. Perceived difficulty was much higher in Noise than in Quiet and still higher in Distraction condition. Clear-cut interindividual differences were found in perceived difficulty, indicating differences in stress tolerance.

Dornic, S., and Stelmach, G. E. Arousal and recall in a simple motor task. No. 47.

An experiment was performed to examine whether arousal induced by white noise would affect short-term motor memory. Two groups of subjects were tested under either control or arousal conditions on a linear slide task. Each group participated in two sessions with twelve target locations presented within each session. There was a 10 minute interval between the sessions. Examination of recall errors for Session 1 revealed no differences between groups. For Session 2 constant error revealed that performance in the arousal condition was significantly better than in the control condition. The results were discussed in terms of the role arousal plays in motor memory.

Dornic, S., and Stone, L. A. Performance and perceived difficulty in paced and self-paced tasks. No. 46.

An experiment was performed to study the effect of "time stress" upon the relation between "objective" difficulty (performance) and perceived difficulty. Three serial tasks of increasing complexity were used, all of them involving high information load. The tasks consisted of successively presented complex items which required differentiated response according to a given code. Each of the three tasks was performed under two different conditions, with and without time pressure. In the former condition, the presentation of items was paced (presented at fixed intervals), while in the other condition, the presentation was self-

paced. The results showed that with increasing complexity, performance deteriorated and perceived difficulty increased considerably more in the paced condition. It could be demonstrated that in cases where performance in the two conditions was the same, paced tasks were experienced as more difficult than self-paced task. This is interpreted as due to different "subjective costs" responsible for identical performance. Practical work implications of these findings are suggested.

Dornic, S., Svensson, J. Ch., and Sarnecki, M. Memory trace and expectancy in a recognition task. No. 50.

Two experiments were performed in which the subject's task was to recognize a visual signal in a series of non-signals. Signals were presented only in the first, shorter part of the session. In the second part only non-signals were presented, although subjects were instructed to report signals throughout the whole session. A high number of false alarms during the signal-free period was found, this being inversely related to the number of hits in the first part of the session. There was no significant decline in subjective confidence throughout the session. The results are interpreted as due to expectancy and to decreasing strenght of the memory trace of the signal.

Herbert, A. Measurement of perceived work difficulty. No. 52.

The study aimed at finding answers to the following questions: Can people rate the difficulty of their work-tasks in a consistent way? How is the agreement among persons rating the difficulty of the same tasks? Do the results obtained by different rating methods differ from each other. Three different groups of employees were studied - psychologists engaged in vocational counselling, telephone maintenance men, and claims adjusters of an insurance company. The subjects rated the average difficulty of tasks belonging to their job. The rating-methods were pair-comparisons, graphic scale, category scale, and numerical scale. The ratings were examined with regard to intra- and inter-rater reliability, and the rating-scales compared with regard to the distribution of rating-scores and the capacity for discrimination. The median rank correlation between an individual's repeated ratings ranged, for different groups of subjects, between 0.70 and 0.90. The inter-rater reliability, measured by the coefficient of concordance, was about 0.60. The rank order of difficulty among tasks was almost the same, irrespective of rating methods used, but the total distribution of ratings differed conspicuously. In a group where preference, for different tasks and uncertainty about outcome were measured, the results indicate that the more difficult tasks were preferred, and that a fairly strong relationship existed between uncertainty about outcome and perceived difficulty.

Herbert, A. Factors in the perception of work difficulty. No. 53.

The study was a preliminary attempt to find out what it is that makes certain work-tasks appear difficult to the worker. Some persons who had rated the degree of difficulty of their ordinary tasks were interviewed about the way they experienced certain

tasks as difficult. This resulted in a list of twenty-eight statements of "why" they were difficult. A larger group of persons with the same kind of jobs then rated the relevance of each one of the statements, for both difficult and easy tasks. For all the statements except one the mean rating score of difficult tasks was higher than that of easy tasks. Some groups of "difficulty factors" seemed to have a fairly strong relationship to the previously measured overall subjective difficulty of tasks, namely 1) effort required for the work, 2) uncertainty or doubt as to one's own ability, 3) activity calling for the judgment of alternative courses of action and their consequences. Factors can also be grouped into "internals" which relate to a person's feelings when he perceives difficulty, and "externals" which are qualities of the work situation.

Santesson, A. The perception of logical principles in a test of reasoning ability. No. 45.

An experiment was conducted with the purpose of investigating whether subjects would perceive different logical principles behind the solution of individual items in a test of reasoning ability. The 32 subjects participating in the study were asked to group items whose solution, according to their opinion, was ruled by the same logical principle. The individual categorizing was limited to those items to which a subject had responded in a testing session prior to the experiment. The number of actual occurrences of each of the combinations of items, $(23 \times 24)/2$, was expressed as a percentage of the number of possible occurrences. The thus resulting matrix was treated by a method of cluster analysis in turn yielding three interpretable clusters. When plotting the items belonging to these three clusters respectively in a graph, relating estimated item difficulty (by the method of magnitude estimation) to the item sequence of a test based on decreasing solution frequencies (data were available from a previous experiment), it was shown that there was a rather great variation within the clusters as far as both perceived difficulty and objective difficulty was concerned. Difficulty could thus not be said to have influenced the subjects in the sorting task. Within each of the obtained clusters an increase of objective difficulty had its correspondence in an increase of perceived difficulty. Thus the same kind of relation was found within clusters as had previously been found between the two measures concerning the total test.

Stelmach, G.E., and Dornic, S. Retention of passive movement as a function of attention and recall delay. No. 48.

An experiment was performed using a simple immediate-memory paradigm. The subjects' task was to recall a passive horizontal movement of varying amplitude after 0, 3, and 7 second intervals. The task was carried out under two conditions. In one condition, movements to be reproduced were presented while the subjects performed an attention task with high information load. In the other condition, the subjects were asked to "fully concentrate" on the motor task. The inspection of the absolute error revealed that in the first condition, performance was markedly worse and in addition there was a significant interval effect. Results were interpreted to support the view that attention plays a major role in short-term motor memory.

PAPERS PUBLISHED IN OTHER REPORT SERIES

Dornic, S. Some studies on the retention of order information. Reports from the Psychological Laboratories, the University of Stockholm, No. 412, 1974.

Retention of order and item information was scored in five memory span experiments. The main results showed that in "difficult" conditions such as lack of attention, information stress, or influence of alcohol, the retention of completely correct messages with the correct order of items was not affected, the overall decrease in performance being due to a poorer retention of messages with a wrong order of items. Clustering of items according to categories (letters, digits) was markedly less pronounced than in the control ("easy") condition. It is suggested that in the above "difficult" conditions, the retention of item information largely depends on the retention of order information, recall of unrelated items in the order of input being more economical than recall in any other order. It is argued that unless recall of positions of the individual items in a string is involved, which requires "breaking up" of the phonologically coded chain traces, retention of order information might be thought of as reduction rather than increase in the information stored.

Dornic, S. Expectancy, memory trace and confidence in a continuous recognition task. Reports from the Psychological Laboratories, the University of Stockholm, No. 423, 1974.

The influence of expectancy on the occurrence of false alarms was studied in a visual task. The subjects had to recognize a signal in a continuous series of non-signals difffering from the signal in form and size. Signals were presented only in the first, shorter part of the observing session. In the other part only non-signals were presented, although subjects were instructed to report signals throughout the whole session. Under the influnce of expectancy, the subjects kept reporting "signals" until the end of the session. The commission error rate was positively related to the frequency of non-signals. Confidence also tended to be higher with high non-signal rate. The results are interpreted as due to changes in the strength of the signal memory trace.

REPORTS FROM THE INSTITUTE OF APPLIED PSYCHOLOGY
THE UNIVERSITY OF STOCKHOLM

ANNUAL REPORT

VI

1975

ANNUAL REPORT 1975

This report presents abstracts of papers reporting the research work of the Institute of Applied Psychology of the University of Stockholm. The first part of the report includes abstracts of works published in international journals and books. In the second abstracts of papers are presented which appeared in the series "Reports from the Institute of Applied Psychology".

The research work reported here was mainly supported by grants from the Swedish Council for Social Science, the Swedish Council for Sports Research and the Tercentenary Fund of the Bank of Sweden.

This report presents only abstracts of articles published in English or other languages than Swedish.

PUBLICATIONS IN INTERNATIONAL JOURNALS AND BOOKS

Borg, G. Fyysisen suorituskyvyn psykofyysinen mittaus (Psychophysical measurements of performance capacity). Suomen Lääkärilehti, Helsinki, 1A/75, Suplementtinumero. (in Finnish).

Dornic, S. Some studies on the retention of order information. In: P. Rabbitt & S. Dornic (Eds.). Attention and performance VI. London: Academic Press, 1975, 230-240.

Retention of order and item information was scored in five memory span experiments. The main results showed that in "difficult" conditions such as lack of attention, information stress or influence of alcohol, the retention of completely correct messages with the correct order of items was not affected, the overall decrease in performance being due to a poorer retention of messages with a wrong order of items. Clustering of items according to categories (letters, digits) was markedly less pronounced than in the control ("easy") condition. It is suggested that in the above "difficult" conditions, the retention of item information largely depends on the retention of order information, recall of unrelated items in the order of input being more economical than recall in any other order. It is argued that unless recall of positions of the individual items in a string is involved, which requires "breaking up" of the phonologically coded chain traces, retention of order information might be thought of as reduction rather than increase in the information stored.

Dornic, S., Deneberg, G.-B., and Hägglund, M. La exploración visual cuando se emplea una lengua dominante o no dominante. Revista de Psicologia General y Aplicada, Madrid, 1975, Vol. XXX, 89-100.

Two experiments were carried out on the influence of short-term memory load on visual search. Forty-eight Swedish subjects with a fluent knowledge of English participated in the experiments. The stimulus field consisted of 49 numbers consisting of two digits or two words, arranged in a 7 by 7 square matrix. In Experiment 1, the numbers were in the form of digits (e.g. 24), in Experiment 2 in the form of either Swedish or English words (e.g. "twenty-four"). The subjects looked for one, two or three targets at the same time. While searching, they were to keep in mind the target names either in their dominant or in their nondominant language. The results showed that the search time grew, in all conditions, as a positively accelerated function of the numbers of targets looked for at the same time, this trend being significantly more pronounced when search was made in the nondominant language. On an average, the search time for symbols (Experiment 1) was shorter than that for words (Experiment 2), but the increase in search time under memory load was relatively greater in Experiment 1.

PAPERS PUBLISHED IN THE REPORTS FROM THE INSTITUTE OF APPLIED PSYCHOLOGY, THE UNIVERSITY OF STOCKHOLM

Borg, G., Edgren, B., and Noble, B. Effects of physical conditioning on perceived exertion and working capacity. No. 63.

For two months conscripts were exposed to a conditioning programme consisting chiefly of running. For the study of training effects, a battery of tests on a bicycle ergometer was carried out before and after the conditioning programme. The levels and the changes in perceived exertion were analyzed in addition to physiological and performance variables. The analysis revealed training effects in all variables measuring aspects of endurance fitness. The quantitative changes differed between variables. Group homogeneity seemed to play a part in the training effect, which supports the general opinion that individuals respond differently to training. There is probably specificity, depending both upon what training programme is used and upon what test is applied to measure the effect of training. For some variables there seemed to be qualitative differences between the changes, illustrating the complexity of training effects.

Borg, G., and Ohlsson, M. A study of two variants of a simple run-test for determining physical working capacity. No. 61.

Two variants of a simple run-test was used for determing physical working capacity. In the first one the subjects ran three 800-meter courses and in the other two 1200-meter courses. The velocities were steered by means of verbal instructions and the subjects' perception of velocity. The velocity actually used to cover the distance was utilized as a measurement of the performance. The pulse frequency and the subjective exertion taken immediately after the run was used as measurements of the individual effort to accomplish the performance. On a later occasion a 1500-meter race was performed individually with maximal velocity and on still another occasion a bicycle test was carried out. The results in the two courses were plotted in a diagram with the pulse frequency or the subjective exertion against the velocity. Through the individual points "fitting curves" were drawn related to the results of the whole group. The velocity at a certain "exertion-level" was then calculated. High correlations were found between these and the ergometer test and the 1500-meter run. The run tests thus seem to be valuable methods to determine physical working capacity.

Dornic, S. Human information processing and bilingualism. No. 67.

A review is given of the research on different aspects of information processing in bilinguals. Experiments are described on reaction processes, perception, attention and memory, as well as on general efficiency of information processing in dominant and nondominant languages as a function of mental load, language set and interlingual

switching. Relationship between the language structures of a bilingual is discussed mainly in view of the issue of whether he has shared or separate storage systems.

Dornic, S., Svenson, J.Ch., and Sarnecki, M. Recognition of non-attended visual tasks: the difference between pictures and words. No. 65.

Short-term recognition of simple pictures and their visually presented verbal names was studied in an experiment involving two conditions. In Experimental condition, the subjects had to perform a mental task with high information load while they were presented with pictures and words. In Control condition, they attended only to the pictures and words themselves. As expected, recognition performance in Experimental condition was much poorer, but the deterioration was markedly more pronounced with pictures. While subjects in Control condition could recognize significantly more pictures than words, the opposite was true of Experimental condition. The results are discussed in terms of dual coding theory and interpreted as being due mainly to the fact that reading is a more straightforward process than naming.

Edgren, B., and Borg, G. The cycling strength test (CST) as a measure of dynamic muscular strength. No. 64.

The change of dynamic muscular leg strength by a conditioning programme consisting chiefly of running was studied. As expected no changes in leg strength occurred for a group of 40 conscripts. The indicator of dynamic muscular leg strength was determinations according to the Cycling Strength Test (CST) by Borg. The reliablility of CST was higher than .90. Maximal oxygen uptake and measurements of endurance performance correlated rather low but significantly with CST. The "explained" variance between maximal oxygen uptake and endurance performance on the one hand and CST on the other ranged between 15 and 35 %. The procedure for assessment of dynamic muscular leg strength by CST determinations is discussed and recommendations are given.

Edgren, B., and Borg, G. The reliability and stability of the indicators in a simple run test. No. 57.

A simple run test based on the subject's perception of his own running speed and its constancy, the running distance, the time to cover the distance and the heart rate (or perceived exertion) at the end of the run, has been studied for reliability and stability. A pair of instructions for running speed were given to two separate groups of military conscripts, $N_1 = 22$ and $N_2 = 17$. The instructions called for higher running speeds for the first group than for the second group. The subjects ran the same track twice in accordance with one pair of instructions for running speed. For the first run the induced speed - i.e. the induced work intensity - was lower than for the second. Ideally, the test should be carried out on two successive days, but group two could not fulfil this requirement due

to their tasks in the service. The subjects were instructed to try to keep the speed constant during the given run. Running speed, heart rate, and ratings of perceived exertion (according to the RPE-scale) were measured/obtained during and after each run. The results showed that the subjects could clearly discriminate between different instructions for running speed and could keep a good speed constancy during the main part of the run. Steady-state conditions were reached for heart rate and the course of the ratings of perceived exertion was as expected. Retest and learning effects could be identified and assessed. Group differences in running technique and level of motivation were mirrored in the heart rate and RPE indicators.

Fedor-Freybergh, P., and Dornic, S. Performance on some attention and memory tasks as a function of hormonal therapy. No. 68.

The aim of the present investigation was to study the influence of estrogen therapy on some psychological functions in women during climacteric. Altogether 53 subjects divided into two groups (pre- and postmenopausal) were examined before, and after one and six months of estrogen treatment, respectively. Five tests were used measuring performance on tasks involving reaction time, visual search, perceptual speed and interference, concentration ability, short-term memory, and simple logical reasoning. Under the influence of estrogen treatment, a general tendency towards improved performance was observed, this being more pronounced in complex tasks than in simple ones, and more pronounced in accuracy than in speed of performance. Also, performance improvement was greater for the postmenopausal group.

Hallsten, L. Interval estimates by means of a magnitude production technique for loudness and area. No. 59.

Ten subjects gave both point and interval estimates of perceived loudness and circle area respectively by means of magnitude productions. Each stimulus called for three different estimates. One estimate should correspond to the lowest value conceivable as appropriate to the subjective magnitude of the stimulus, another should represent the highest possible value while in addition, one estimate should correspond to "the most reasonable" value. The order in which the subject was requested to give these three estimates was varied. It was found that the ratios between the lowest and the highest estimates increased with the stimuli and that the overall ratio level was higher for area than for loudness. The interval estimates had an equivocal relationship to ratings of perceived difficulty which the subjects felt in giving the point estimates. In many instances the subjects gave productions which were inconsistent with the order information in the multiple estimates, probably due to a contrast effect and/or, on a more abstract level, too high a mental load on the subjects. Multiple responses were concluded to offer further possibilities of evaluating scaling behavior in terms of validity and consistency in psychophysical experiments.

Hallsten, L. Interval estimates and ratio scale demands. No. 60.

The relevance of interval estimates to ratio scale demands was studied. First it is shown that interval estimates may be applied in the examination of the ratio scale properties of ordinary point estimates. Second, two sufficient and consistent sets of ratio scale demands for interval estimates with different generalities are outlined. Third, it is argued that one common form of inconsistency found for point estimates might be attributed to cognitive processes connected to interval estimates. Some empirical data are provided as illustrations of these lines of reasoning. Among other things, no inconsistency for point estimates was manifested when evaluated in terms of interval estimates. The distinction between arithmomorphic and dialectic concepts and their application to constructs such as sensations, percepts, etc. are discussed.

Hallsten, L., Borg, G. Six rating scales for perceived difficulty. No. 58.

Six rating scales were compared as to their adequacy for measuring perceived difficulty of intelligence test items. Each one of nine psychologists estimated the perceived difficulty of 15 test items by five category scales with a different number of scale steps and by magnitude estimation. The adequancy was evaluated against three types of criteria: reliability, validity and applicability. There were no significant differences among the scales in test-retest reliability, in validity as measured by correlation to the solution frequencies or in the administrative requirements. However, there were some indications of different sensitivity to the effects involved, the items, subjects and their interaction. Furthermore, most subjects maintained that they preferred the category scales with the least number of scale steps.

Hockey, R., Dornic, S., and Hamilton, P. Selective attention during reading: the effect of noise. No. 66.

The effects of white noise, presented through headphones, were examined in a selective reading task (a visual analogue of selective listening). Subjects read one of two interleaved messages as quickly as possible under either noise or quiet conditions, and were then given a recognition test for target words from the two messages. Values of the recognition index, d′, were higher for the attended than for the rejected message for all subjects. In addition, d′ for the attended message was higher for the noise condition, though no differences were found for the rejected message. Subjects were also faster in reading the message under noise. These results offer support to previous demonstrations of increased selectivity in noise, and suggest a useful place for this kind of task in research on selective visual attention.

Ohlsson, M., Sjöberg, H., and Dornic, S. Effect of physical fitness on mental performance after physical work. No. 62.

Two groups of subjects with different levels of physical fitness (24 well-trained, and 24 less well-trained male students) performed a serial mental task immediately after physical work of five different degrees of difficulty. The task included high information load, placing great demands on continuous concentration and switching of attention as well as on sensory (short-term) memory. The physically more fit group performed significantly better (committed markedly less errors) than the less fit group. The results indicate that the former group could better resist the negative aftereffects of physical effort, in spite of the fact that the r e l a t i v e physical work load levels were the same for both groups.

Pavlina, Z., and Sarić, I. The interrelationship among three measures of physical stress: absolute heart rate, relative heart rate and ratings of perceived effort. No. 56.

The main purpose of this study was to determine which of two objective measures of physical stress - absolute or relative heart rate - is more closely correlated with the subject′s ratings of perceived effort. The experiment was carried out on 24 healthy male subjects between 18 and 48 years of age. The subjects were asked to pedal a bicycle-ergometer. Before the work the initial heart rate was measured. Each subject was instructed to work as long as possible. The initial load on the pedals was 100 kpm/min and every 4 minutes the load was increased by 200 kpm/min. The load increases were carried out without interference with the pedalling and without the subjects knowledge. At the end of each 4-minute period heart rate was determined and the subject rated his perceived effort. Measured heart rates were converted to relative values. Thereafter, correlations between absolute heart rate and effort ratings and between relative heart rate and these ratings were investigated. Computed correlation coefficients indicate that the subject′s perception of his own effort is more closely correlated to relative heart rate (r_{xy} = .94) than to absolute heart rate (r_{xy} = .90).

PAPERS PUBLISHED IN OTHER REPORT SERIES

Sjöberg, H., Ohlsson, M., and Dornic, S. Physical fitness, work load and mental performance. Reports from the Psychological Laboratories, the University of Stockholm. No. 444, 1975.

Two groups of subjects with different physical fitness (24 well-trained, and 24 less well-trained male students) participated in an experiment involving two mental tasks performed under five different physical work-load conditions. Task 1 included high information load, placing great demands on continuous concentration and switching of attention as well as on short-term memory. Task 2 involved pair associate learning with recall following short and long retention delays. In Task 1, the well-trained group performed better at all work-load levels, the overall difference between the groups being highly significant. Virtually no difference was found in Task 2. Although a broad range of arousal levels was employed, no support has been found for the inverted U-curve in either of the two tasks.

Produktion: PR System AB, Göteborg. Erik Järhult och Leif Nelvin.
Huvudfotografer: Bengt Sahlén, Göteborg och Göte Tarle, Bromma. Tryck: Risbergs Tryckeri AB, Uddevalla.

ARBETARSKYDDSFONDEN

Arbetarskyddsfondens styrelse. Sittande fr v: Generaldirektör Gunnar Danielson, Arbetarskyddsstyrelsen, F förbundsordförande Åke Nilsson, Arbetarskyddsfonden, Kanslichef Bo Oscarsson, Arbetarskyddsfonden, Med.lic Erik Bolinder, LO.
Stående fr v: Direktör Gunnar Lindström, SAF, Med.lic Nils Masreliez, SAF, Direktör Hans Forselius, Svenska Kommunförbundet, Förhandlingsdirektör Olof Lindahl, Statens Avtalsverk, Direktör Sven Ahlgren, Sveriges Kommunaltjänstemannaförbund, Intendent William Peterson, SACO/SR.
Av styrelsens ordinarie ledamöter saknas: Ombudsman Leif Kjellstrand, LO.

Debatten om arbetsmiljön har dragit fram en rad allvarliga brister. Olycksfall, kemiska hälsorisker, buller, psykiska och sociala problem är några uppmärksammade områden.
Forskningen har länge släpat efter på grund av otillräckliga resurser och bristande medvetenhet om problemen. Därför finns idag stora fält, där rejäla insatser måste göras.
Arbetarskyddsfondens uppgift är klar och entydig. Fonden ska stödja praktiskt inriktad forskning, som kan motverka yrkesskador och yrkessjukdomar eller i övrigt förbättra arbetsmiljön.
Vad som ger fonden extra handlingskraft är möjligheterna till ordentlig uppföljning. Vi är inte låsta till att stödja enbart forskning, utan bidrar också till utvecklingsarbete för att föra ut ny teknik som kan skapa en god miljö på arbetsplatserna.
Viktigt är också fondens stöd till breda utbildnings- och informationsprogram. På så sätt kan vunna erfarenheter föras vidare ut till alla dem som deltar i det praktiska skyddsarbetet.
De betydande ekonomiska resurser, som ställts till arbetarskyddsfondens förfogande, gör fonden till ett viktigt instrument för att skapa en bra arbetsmiljö.

Åke Nilsson
Ordförande

Bo Oscarsson
Kanslichef

Arbetsmarknadens parter är med och styr fonden

En institution i utveckling

Arbetarskyddsfonden tillkom 1972.
Två år tidigare hade en statlig utredning skisserat riktlinjerna för fondens verksamhet och finansiering. Förslaget fick ett positivt mottagande. Arbetsgivare- och löntagarorganisationerna ställde sig bakom.

De medel som skulle tillföras fonden fick inte bara bli en omfördelning av redan befintliga resurser för att förbättra arbetsmiljön utan skulle bli ett verkligt nytillskott. Det underströk regeringen i propositionen till riksdagen.
Fondens första år har präglats av intensivt utvecklingsarbete. Särskild uppmärksamhet ägnades till en början fyra områden - olycksfall, kemiska hälsorisker, skiftarbete och branschstudier. Andra områden har senare kommit in i bilden. Problemens omfattning och karaktär har studerats i expertgrupper och i nära kontakt med arbetsmarknadens organisationer. Inriktningen av fondens mer långsiktiga arbete har därmed börjat att ta form.
Allmänt gäller att fondens bidrag avser sådana frågor som är av betydelse för hela yrkesgrupper eller på annat sätt stora delar av arbetslivet. Ansvaret för det vardagliga skyddsarbetet ligger på varje företag.

Utvecklingsarbete och utbildning

Fonden stärktes avsevärt 1974. Dels mer än fördubblades de ekonomiska resurserna, dels vidgades ramarna för verksamheten. Fonden fick rätt att bidra till utvecklingsarbete för att få nya tekniska lösningar utprovade. Vidare beslöts om en hårdare satsning på utbildning. Skyddsombuden var alltifrån början en prioriterad grupp. Fr. o. m. 1974 kan bidrag utgå också för utbildning av arbetsledare, tekniker och andra som är med och formar arbetsmiljön.

SACO/SR TCO

Lf LO

Kommunförbundet

sav SAF

Effektiv informationsspridning en huvuduppgift

Resultaten av fondens satsningar kan idag ses på ett begränsat, men växande antal områden. Forskning kring arbetsmiljön är ofta tidskrävande, uppföljning av nya idéer genom teknisk utveckling och utbildning/information likaså.
En central uppgift är att hitta vägar för att effektivt föra ut forskarnas och teknikernas erfarenheter på bred front, att bidra till att resultaten verkligen tas till vara i arbetslivet.

En bred kontaktyta

Arbetarskyddsfonden har genom styrelsen en fast förankring i arbetslivet. Styrelsen, högst 11 ledamöter, utses av regeringen efter förslag av parterna på arbetsmarknaden.
LO och SAF nominerar två ledamöter var. TCO, SACO/SR, Statens Avtalsverk samt Landstingsförbundet/Kommunförbundet gemensamt föreslår en var. Ytterligare tre styrelseledamöter utses direkt av regeringen.

Litet kansli — breda referensgrupper

Förankringen i arbetslivet markeras inte bara genom styrelsens sammansättning utan även genom fondens arbetsmetoder.
Kansliet, som finns i Wenner-Gren Center i Stockholm, har ett 20-tal medarbetare. Förslag till riktlinjer och kartläggning av forskningsbehov (programarbete) utvecklas i partsammansatta arbetsgrupper. Inom flera områden har fonden tillsatt styrgrupper med tekniker, forskare och representanter för arbetslivet.
Styrgruppernas uppgift är att samordna de projekt fonden stöder, se till att olika problem blir belysta och medverka till att resultaten från projekten kommer till praktiskt utnyttjande.
Också anslagsarbetet, bedömningen av ansökningar om bidrag, görs i nära samarbete med forskare och organisationer.

ASF om forskning och utveckling

". . . främst sådan forskning, vars resultat kan väntas få praktisk användning inom arbetslivet, och sådant utvecklingsarbete, som behövs för att nya tekniska lösningar skall komma i praktisk tillämpning . . ."
Så heter det i instruktionen, som slår fast fondens huvudinriktning. Ordet praktisk betyder att fonden går in i projekt, vars resultat kan väntas få direkt betydelse i arbetslivet. Det gäller både forskning och tekniskt utvecklingsarbete.
Fonden har alltså möjlighet att stödja vitt skilda insatser, såväl inom det traditionella arbetarskyddet som inom andra områden. Det finns en mängd aspekter på arbetsmiljön som är viktiga att belysa och där det behövs konkreta resultat. En viktig strävan är att projekten redovisas med klara åtgärdsförslag, där så är möjligt, för att de som kommer i kontakt med problemen i sitt jobb verkligen ska kunna dra nytta av vunna erfarenheter.

ASF om utbildning

Skyddsombud, arbetsledare, tekniska planerare och andra som är med och utformar arbetarskyddet samt personal inom företagshälsovården. Det är de grupper fondens utbildningsinsatser riktas mot.
Den nya arbetarskyddslagen har medfört ett starkt behov av grundutbildning för omkring 90 000 skyddsombud och nästan lika många arbetsledare.
Därutöver går fonden in och bidrar till fortbildning av andra nyckelgrupper inom arbetarskyddet.
Liksom på forsknings- och informationssidan skall fonden verka för samordning inom utbildningen. Här gäller det främst vid framtagning av studiematerial som bör kunna utnyttjas av stora grupper och kunna anpassas till flera branscher.

ASF om information

Generellt gäller att upplysningsverksamheten ska riktas till stora grupper inom arbetslivet.
Fondens informationsarbete består av flera delar.

- Breda satsningar som initieras och samordnas av fonden. Det kan gälla upplysningar om olika miljöfaktorer, t ex buller, ryggskador, olycksfall.
- Stöd till de anställdas organisationer för medlemsinformation i arbetsmiljöfrågor.
- Stöd till särskilda projekt där ansökan inlämnas i vanlig ordning.
- Bidrag till tidningen Arbetsmiljö, så att den kan distribueras till alla skyddsombud.
- Information om pågående och genomförda projekt.

1975: 100 miljoner kronor och över 370 projekt

0,075 % går till fonden

Fondens ekonomi baseras inte på ränteavkastningen av väldiga tillgångar utan på kontinuerliga inkomster från en arbetarskyddsavgift som alla arbetsgivare — företag, kommuner och staten — betalar.
Arbetarskyddsavgiften är en del av den allmänna arbetsgivareavgiften.
1974 ökade arbetarskyddsavgiften och den del som går till fonden höjdes från 0,03 % till 0,075 % av lönesumman. De statliga arbetsgivarna tillkom. Tidigare hade enbart enskilda och kommunala arbetsgivare betalat. Till inkomsterna från arbetarskyddsavgiften kommer vissa ränteintäkter. Totalt uppgick fondens intäkter 1975 till nära 100 miljoner kr.

1975. Fondens fjärde verksamhetsår. Bara rubriken — 100 milj kr och 370 projekt — ger en antydan om storleken av fondens verksamhet.
Under 1975 beviljade fondens styrelse drygt 70 milj kr till nya projekt och i fortsättningsanslag. Av de 370 projekten var 270 nya för året.

Forskning, utveckling och utbildning svarar för 75 %

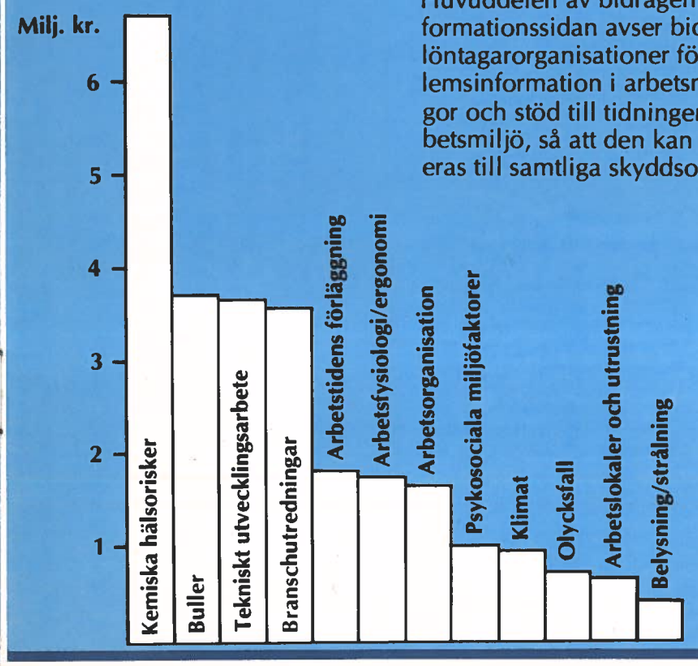
Cirkeldiagrammet visar fördelningen av anslag inom fondens huvudområden. Forskning och utveckling samt utbildning svarar för merparten, 3/4 eller drygt 53 milj kr av de beviljade anslagen. Av den resterande fjärdedelen gick 11,6 milj kr till arbetarskyddsstyrelsen, bl a för utbildning av personal inom företagshälsovården, de regionala skyddsombudens verksamhet samt särskilda projekt som arbetarskyddsstyrelsen genomförde. För 1976 fördubblas i runda tal den summan, främst beroende på den starka utbyggnaden av den regionala skyddsverksamheten för mindre arbetsställen. Den sista sektorn avser fondens stöd till informationsverksamhet m m.

Under 1975 gick 3/4 av fondens beviljade anslag till forskning och utveckling samt utbildning.

Forskning och utveckling

På de följande tre uppslagen sammanför vi FoU-verksamheten i fyra huvudområden, som vart och ett består av ett antal delområden.

Inom FoU väger kemiska hälsorisker, bullerfrågor, branschutredningar och tekniskt utvecklingsarbete tyngst. Staplarna visar fördelningen mellan olika forskningsområden. Beviljade medel 1975.



Stapeldiagrammet visar fördelning (milj kr). De fyra största delområdena är kemiska hälsorisker, buller, utvecklingsarbete och produktutveckling samt branschutredningar. Här ligger också det största antalet projekt — 136 av hela FoU-områdets 212 pågående projekt.

Bättre arbetsmiljö

Fondens stöd till utbildning av skyddsombud, arbetsledare med flera grupper dominerar utbildningsverksamheten för 1975. Produktionskostnader för kursen BÄTTRE ARBETSMILJÖ (NYA TEMA som kursen kallas på den kommunala sektorn) samt internatutbildning och handledarutbildning väger tungt. Huvuddelen av bidragen på informationssidan avser bidrag till löntagarorganisationer för medlemsinformation i arbetsmiljöfrågor och stöd till tidningen Arbetsmiljö, så att den kan distribueras till samtliga skyddsombud.

Kan bara forskare få bidrag?

När det gäller forskning dominerar helt naturligt högskolor och forskningsinstitut, antingen som direkta mottagare eller via branschorganisationer som vill ha en speciell fråga belyst.
Stödet till praktiskt utvecklingsarbete har i flertalet fall gått till projekt i företag. Ofta har det varit i nära samarbete med forskare och uppfinnare som kommit på en idé som sedan fonden beslutat gå vidare med. Ett av kraven från fondens sida är att projektet ska ha generellt intresse och inte stanna vid en enstaka arbetsplats. Ett annat krav gäller återbetalningsskyldighet om projektet visar sig lönsamt.
Gemensamt för utbildning och information är att aktiviteterna ska rikta sig till breda grupper. Därför krävs som regel att arbetsmarknadsorganisationerna centralt eller på förbundsplanet står bakom.

Blanketter för ansökan kan rekvireras via fondens kansli.
Ansökan bör vara inne före 1 mars eller 1 september. Tag gärna kontakt med fonden innan ni skickar in ansökan.

Man vet för lite om kemiska ämnens skadliga effekter

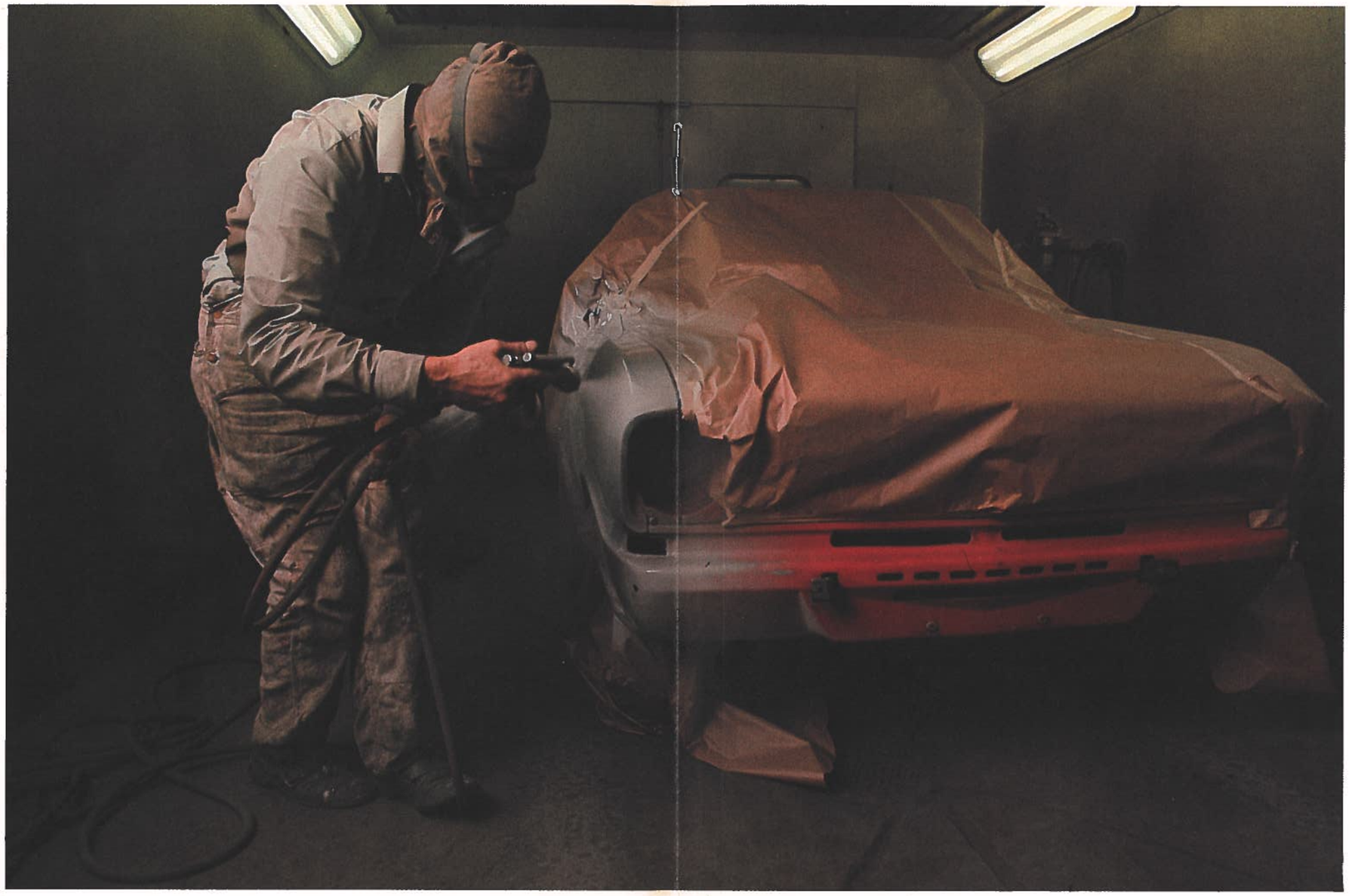
På det här och nästa två uppslag vill vi ge en översikt av fondens stöd till FoU. Avsikten är inte att i detalj redovisa enskilda projekt, utan mer att gå in på problem och arbetsuppgifter inom fyra huvudområden. Kemiska hälsorisker, fysiska miljöproblem, det psyko-sociala området samt övergripande branschprogram.

500 nya ämnen varje år

Man känner till runt 2 miljoner kemiska substanser. 500 nya ämnen kommer ut på marknaden varje år. Vissa ämnens effekter på människan är tämligen väl klarlagda, men för ett stort antal ämnen är dokumentationen ofullständig eller saknas helt. Speciellt gäller det inverkan på lång sikt och i små doser eller låga koncentrationer.
Det ger en antydan om problemets storlek och svårighetsgrad.

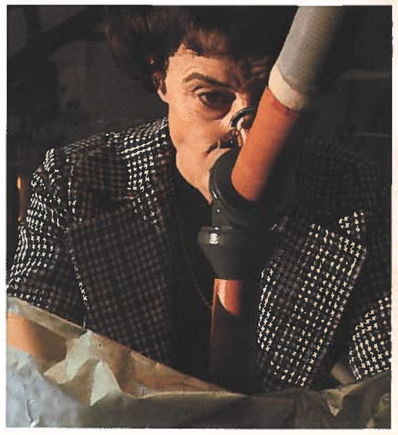
Utveckling efter flera linjer

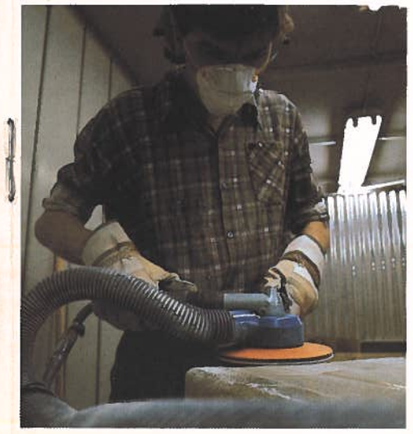
Fondens insatser inom området kemiska hälsorisker följer två huvudlinjer. Dels stöd till forskning som berör olika ämnens skadliga effekter, dels utveckling av eliminationsteknik för att minska riskerna på arbetsplatserna. Redan vid blotta misstanken att ett ämne är hälsofarligt bör eliminationstekniska åtgärder sättas in, t ex genom punktutsug och inkapsling eller ännu hellre genom helt nya arbets- och produktionsmetoder.
Just de bristfälliga kunskaperna motiverar fondens engagemang för att få fram grundläggande fakta. Jämsides med forskningen om ämnens giftverkan, som framför allt bedrivs vid universitet och forskningsinstitutioner, bidrar fonden till projekt för utveckling av mät- och provtagningsmetoder.



Vilka kemiska hälsorisker utsätts bil- och industrilackerare för genom t ex lösningsmedel och färgämnen? En kartläggning av ett 90-tal arbetsplatser pågår. Undersökningen, som leds av laborator Bengt Knave, arbetarskyddsstyrelsen och professor Lennart Widén, Karolinska Sjukhuset, består dels av en yrkeshygienisk del, dels av en ingående undersökning av ev. skador från lösningsmedelspåverkan. Ett av målen är att registrera långsiktiga förändringar.

Inom det medicinska fältet har också epidemiologiska projekt kommit igång för att studera samband mellan hälsotillstånd och ämnen man utsätts för i arbetsmiljön.





På basis av studier inom arbetarskyddsstyrelsen har de hygieniska gränsvärdena för ett antal lösningsmedel sänkts, bl a toluen. Professor Irma Åstrand som lett arbetet, har här själv tagit plats på testcykeln. Att få fram gränsvärden som tar hänsyn till arbetsbelastning har varit speciellt viktigt, då man behöver 10 gånger mer luft vid fysiskt tungt arbete än vid lätt arbete.

Inom den plastbearbetande industrin är damm ett av miljöproblemen. För att visa en användbar teknisk lösning bidrog fonden till en referensanläggning vid AB Trelleborgsplast i Ljungby. Omkring 25 arbetsplatser anslöts till en central dammsugningsanläggning. Alla handverktyg försågs med avsugningskåpor, vilket reducerade dammängderna till ca 1/3.

Eliminationsteknik

Fondens praktiska inriktning ligger bakom en stark satsning på eliminationstekniska åtgärder.
I flera fall är det branschstudier med tonvikten lagd på kemiska hälsorisker. Det gäller miljöproblem vid svetsning, inom bilplåtslagerier och billackeringsverkstäder, gummi- och plastindustrin. Andra projekt tar upp lösningsmedel inom färgindustrin, vid målning och vid arbete inom den grafiska industrin.
Under 1975 medverkade fonden till över 70 projekt inom det kemiska området, vilket är nära en tredjedel av samtliga forsknings- och utvecklingsprojekt.

Farliga ämnen

Forskningsbehoven är stora inom hela det kemiska området. Bland ämnen fonden satsar betydande projektmedel på märks tungmetaller och flyktiga organiska ämnen, t ex lösningsmedel. Speciellt viktigt är att utvärdera och få fram vilka ämnen som är minst toxikologiskt aktiva och samtidigt har fullgoda tekniska egenskaper för olika ändamål.
Andra typer av kemiska miljöfaktorer är industriella oljor samt ämnen som förekommer vid tillverkning av plaster. Vidare är problem med damm, gaser samt allergiframkallande ämnen angelägna att åtgärda.

Referensanläggningar

För att kunna prova ut nya tekniska lösningar måste man ofta arbeta med referensanläggningar.
Man utför praktiska försök på vanliga arbetsplatser. Kostnaden brukar ofta fördelas mellan fonden och det företag, där referensanläggningen byggs upp. Systemet med referensanläggningar tillämpas inte bara inom det kemiska området utan inom flertalet områden.

Mycket återstår att göra inom det traditionella arbetarskyddets område

Det traditionella området för arbetarskydd är de fysiska miljöfaktorerna. Buller, belysning, strålning, klimat. Hit kan också räknas planering och utformning av arbetslokaler, arbetsfysiologi och ergonomi. En viktig del är kampen mot olycksfall.
De fysiska miljöproblemen spänner över ett brett fält. Många problem är väl utforskade, men mycket återstår. Framför allt gäller det att få fram konstruktiva idéer till praktiska lösningar — och att få dessa tillämpade på stor bredd.

Bullergrupper

Buller är det vanligaste miljöproblemet inom flera yrkesområden. Det visade bl a en LO-enkät för några år sedan. Från fondens start har buller varit högt prioriterat. Stödet har främst gått till att utarbeta nya tekniska lösningar speciellt anpassade till olika branschers förhållanden.
Arbetet har i flertalet fall drivits i partsammansatta arbetsgrupper, som också svarat för olika informationsåtgärder.
De bullergrupper fonden bidrar eller har bidragit till är:

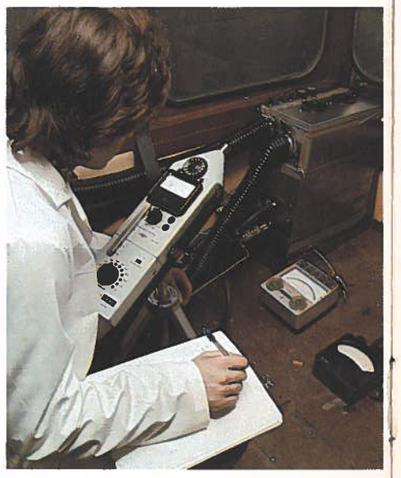
Betongvaruindustrin
Cellulosa- & pappersindustrin
Grafiska branschen
Livsmedelsindustrin
Stenindustrin
Sågverksindustrin
Textilindustrin
Träindustrin
Verkstadsindustrin

Ett betydande arbete har skett inom bulleområdet. För att samla kunskaperna och effektivt föra ut dem i hela arbetslivet ställs stora krav på information och samordning, vilket också arbetarskyddsfonden uppmärksammat.

Planering och projektering av lokaler. Det är ett område som fonden på olika sätt följt upp. Bl a har en arbetsgrupp föreslagit riktlinjer för verksamheten. Ett projekt, som drivs vid Mjölkcentralen Arla i Stockholm, försöker utveckla metoder för att ge de anställda bättre möjligheter att påverka planeringen.

Mer än 100 000 skadas på jobbet varje år

Enligt yrkesskadestatistiken är ca 90 % av alla yrkesskador olycksfall i arbetet. Det betyder omkring 110.000 olycksfall!
Den arbetsgrupp som vid fondens start fick i uppdrag att analysera olycksfallsforskningen konstaterar att olycksfallen tycks ... ”antingen ha blivit bortglömda eller anses orsaksmässigt så väl kända eller utredda att ytterligare kunskaper inom detta område inte behövs ... När man försöker göra en kartläggning inom detta område finner man emellertid att kunskapen ingalunda är djup eller omfattande. Det synes, beträffande olycksfallsproblematiken, finnas en rad faktorer som endast i ringa utsträckning är klarlagda och där vår kunskap i dag är mycket bristfällig.”
Fonden ser olycksfallsforskning som en väsentlig uppgift och har därför sökt stimulera en bred forskning. För att samla in utländska erfarenheter och rekrytera forskare har fonden vidare inrättat ett antal stipendier, bl a inom olycksfallsforskning.



Förarhytten är en av de vanligaste arbetsplatserna. Och problemfylld inte minst ur klimatsynpunkt. Under sommaren blir värmen ofta olidlig. Fonden har därför satsat på forskning och utveckling. Ett projekt drivs av Jordbrukstekniska Institutet, Ultuna. Man söker där ta fram grunddata om tolerabel värme och effektiviteten av olika värmeavlastande metoder. Det gäller då inte bara

värme utan också dammproblem och för olika maskintyper inom jordbruk, skogsbruk, entreprenadverksamhet och industri.
AB Termofrost har vid sin anläggning i Arvika utvecklat ett luftkonditioneringsaggregat, där föraren själv kan kontrollera hyttemperaturen inom vida gränser med helt stängd hytt för att undvika buller och damm.

Program för planering av den fysiska miljön

Många arbetsplatser har allvarliga brister i miljön därför att de aldrig blev granskade ur miljösynpunkt när de byggdes.
1973 tillsatte fonden en arbetsgrupp för projektering och planering av arbetslokaler. Gruppens arbete aktualiserades ytterligare genom arbetarskyddslagen som ger skyddsombuden rätt att delta i planering av nya eller ändrade lokaler.
I arbetsgruppens slutrapport dras riktlinjer upp för ett fortsatt forskningsarbete. Man framhåller bl a att det krävs utveckling av riktlinjer och typlösningar för bestämda arbetsplatser/lokaler, där såväl produktionsteknik och arbetsorganisation som maskiner, handverktyg och rumsliga/fysikaliska förhållanden noga övervägs. Detta ska ske tillsammans med de anställda.

För att underlätta de anställdas medverkan behövs checklistor och andra hjälpmedel bl a vid förhandsgranskning av ritningar.

Handskador är vanliga. De skyddshandskar som finns att köpa har ofta brister. Anatomiska institutionen vid Göteborgs universitet har gjort en undersökning och bl a på basis av fakta från den undersökningen har Per Lars Jos i Malung tagit fram en provserie handskar med greppskydd mot skär-, friktions-, bränn- och klämskador. Utvecklingsarbete pågår för att få fram ett lämpligt material för denna handske.

Stigplansberedning är ett förberedande arbete inför gjutningen i ett stålverk. Ihåliga tegelstenar läggs i en form och under arbetet utsätts operatören bl a för kraftig värme från formarna och obekväma arbetsställningar. I ett projekt, som leds av professor Ulf Åberg, STU, söker man komma tillrätta med stig-

planläggarnas besvärliga arbetssituation. Vid SKF i Hällefors, har bl a en prototyp för själva läggningsarbetet konstruerats som avsevärt underlättar det arbetsmomentet. Med hjälp av iläggningsramen kan arbetet ske stående.

Bra arbetsmiljö är inte bara ett riskfritt jobb. Det handlar också om psykiska och sociala faktorer

Skiftarbete

Hur påverkas människan psykiskt och fysiskt av skiftarbete?
Vad betyder arbetstidens förläggning för kontakten mellan barn och föräldrar, hur inverkar arbetstiden på olika aktiviteter utanför arbetet?
Föreligger ett samband mellan skiftarbete och frånvaro/olycksfall etc?
Flera omfattande forskningsprojekt, som rör arbetstidsfrågor och deras psykiska, medicinska och sociala effekter på människan, har kommit i gång under 1973—1975.
Fonden har också låtit statistiska centralbyrån göra en första undersökning av hur svenska folket fördelar sig på olika obekväma och oregelbundna arbetstidsformer. Grundläggande data har därvid framkommit om bl a ålders-, köns-, näringsgrensfördelning.

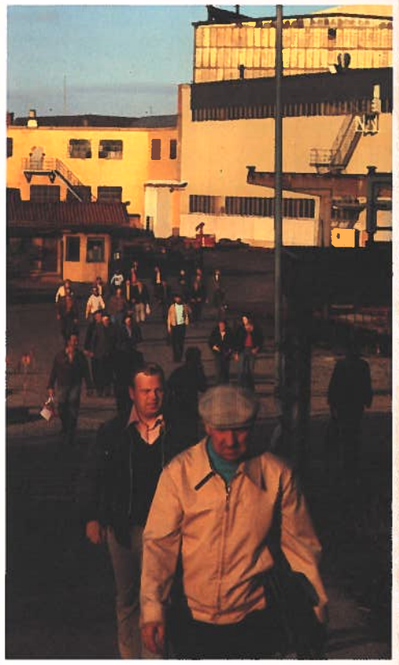
Inte bara skiftarbete

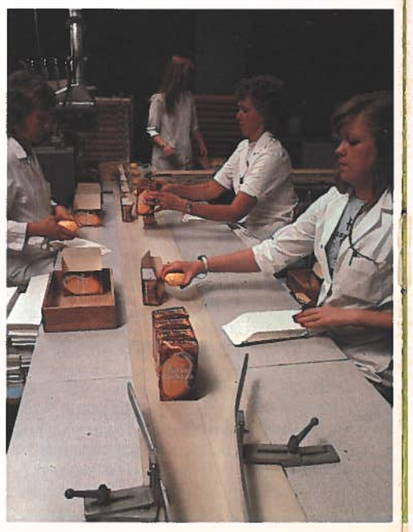
Arbetssituationen för många arbetstagare är i dag styrd av produktionstekniken. Ökad mekanisering, automation/rationalisering inverkar i hög utsträckning på arbetsvillkor och arbetsinnehåll.
En viktig del av den psykosociala arbetsmiljöforskningen syftar till att åstadkomma minskad monotoni, minskad bundenhet och i övrigt minskad psykisk påfrestning i arbetet. Inte minst gäller det hur arbetet skall organiseras för att öka arbetstillfredsställelsen. Upplevelse av monotonin förstärks många gånger av arbetarens bundenhet till maskinen. Buller och långa avstånd försvårar mänskliga kontakter. Samordnade insatser från flera vetenskaper behövs ofta här för att resultaten skall bli verkningsfulla.

Arbetsorganisation

Datateknologins effekter på arbetsmiljön undersöks i ett antal projekt med stöd från fonden. Bl a studeras hur olika principer för organisation av datorbaserade system inverkar på det sätt på vilket olika arbetsgrupper fungerar i sin miljö. Vidare studeras datoriseringens socialpsykologiska effekter. Hur relationer mellan arbetstagare, arbetsinnehåll, attityder m m påverkas av införande av administrativa datarutiner.
Nya arbetsformer som t. ex. ökat lagarbete i produktionsgrupper medför höjda krav på inlärning av nya arbetsuppgifter, att kontakterna mellan arbetstagarna ökar. Studier avseende detta pågår med stöd från fonden. Den anställdes inflytande vid utformning av arbetsmiljön studeras, likaså olika samarbetsformer vid planering av produktion.
Frånvaron i arbetslivet har även uppmärksammats. Långtids- och korttidsfrånvaro utreds med avseende på ett flertal faktorer. I en annan studie tas sjukfrånvaro, individens sociala situation och sjukdomsutveckling över flera år upp, med avseende på olika sjukskrivningsmönster, sjukfrånvarons samband med olycksfall etc. Arbetsmiljö — arbetsfrånvaro och hälsa är en annan pågående undersökning, som behandlar förvärvsarbetande kvinnors sociala, medicinska och psykologiska situation.

Det psyko-sociala området är ett samlingsbegrepp för flera delområden. Hit räknas t ex arbetsorganisation och frågan om skiftarbetets effekter, som uppmärksammades redan under fondens första år. Ett flertal studier har belyst skiftarbetets konsekvenser. Ett annat problem som flera projekt behandlat gäller den ökade automationen i arbetslivet, både bland kollektivanställda och tjänstemän. Tjänstemännens arbetsmiljö har belysts i en omfattande kartläggning där omkring 10 000 TCO-medlemmar och 3 000 från SACO/SR söker beskriva sin arbetssituation.





Branschutredningar analyserar samtliga miljöfaktorer

Sjömän, gruvarbetare, svetsare och ytbehandlare, städerskor, anställda inom gummi- och färgindustrin, hamnarbetare, växthusarbetare, renhållningsarbetare, brandmän, sågverksarbetare, hotell- och restauranganställda.
Se där några branscher och yrkesgrupper som varit föremål för s k branschutredningar eller där man just nu är igång. Branschutredningarna drivs i nära kontakt med organisationer och företag och innebär att man i ett sammanhang studerar en hel branschs eller en hel yrkesgrupps arbetsförhållanden. Såväl kemiska som fysiska och psyko-sociala miljöfaktorer.

Tvärvetenskapligt angreppssätt

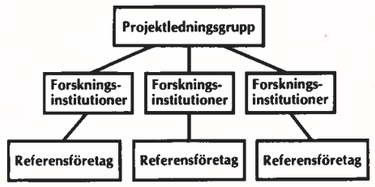
Det betyder normalt att det krävs tvärvetenskapliga insatser. Syftet är att kartlägga olika miljöfaktorer för att på detta sätt få en samlad bild av arbetsmiljön. Den viktigaste delen av arbetet är emellertid att gå igenom vilka tekniska möjligheter till förändringar som finns och att få till stånd konkreta åtgärdsprogram för förändringar. Genom referensanläggningar vid utvalda företag kan förslag och idéer omsättas i praktiska lösningar. Med den här metoden får man också fram underlag till förbättringar som exempelvis maskinleverantörer kan utnyttja.

En modell

Normalt tillsätts en arbetsgrupp med representanter både för arbetsgivare och löntagare samt enskilda experter. Gruppen styr projektet och arbetar tillsammans med forskningsinstitutioner och referensföretag för att genomföra utredningar och utvecklingsprojekt. Att kunna göra försök i företag betyder mycket för att få fram effektiva lösningar.

Branschundersökningar bygger på ett samspel mellan forskare med olika inriktning, branschorgan och företag. Utgångspunkten är att allsidigt söka studera en branschs eller utsatt grupps samtliga miljöproblem. Fonden har tagit initiativ till och stött en rad branschstudier. Inte minst inom branscher med många små eller medelstora arbetsplatser, t ex hotell & restaurang. En omfattande

studie som tidigast beräknas bli klar 1977 kartlägger de ombordanställdas situation. 15 fartyg tjänar som referensföretag. Inom sågverksindustrin har i flera år bedrivits branschstudier. Ett miljöproblem där är buller. Vid John Neikert AB i Urshult — ett av referensföretagen — har man byggt ett "hus i huset" för att reducera sågbullret.



Ett viktigt led i branschvisa undersökningar är att få fram underlag och åtgärdsprogram för mindre företag. För att man ska kunna nå ut till dessa krävs stora insatser för information och utbildning.

Utbildning & Information

Mer än 50 miljoner kronor

Utbildning och upplysning är väsentliga delar i fondens verksamhet. Många forsknings- och utvecklingsprojekt måste följas upp med information och utbildning, för att resultaten skall bli kända och tillämpade. Under de närmaste åren kommer allt fler betydelsefulla forskningsprojekt att bli klara. Det ställer ökade krav på en effektiv informationsspridning.
Men hittills har de stora satsningarna inom utbildning och information inte varit knutna till enskilda FoU-projekt. Det har framför allt gällt att ge ökade baskunskaper till stora grupper, bl a arbetsledare och skyddsombud.
Sedan fondens start 1972 har mer än 50 miljoner kronor satsats på information och utbildning.

Arbetarskyddslagen skapade ett enormt utbildningsbehov

Den del av arbetarskyddslagen, som trädde i kraft 1974, innebar bl a att alla arbetsställen med mer än 5 anställda skall ha ett skyddsombud. För att skyddsombud och arbetsledare skulle klara sina nya arbetsuppgifter samt få en bättre inblick i aktuella arbetsmiljöfrågor, tog fonden initiativ till att framställa ett omfattande utbildningspaket, BÄTTRE ARBETSMILJÖ. Materialet utarbetades inom Arbetarskyddsnämnden i samarbete med arbetsmarknadens parter.
Materialet är avsett att användas som grundkurs i arbetsmiljöfrågor för hela arbetsmarknaden och hämtar därför sina exempel från skilda arbetsmiljöer. För att få en så nära verklighetsanknytning som möjligt gav fonden dessutom medel till de branscher som önskade komplettera grundkursen med material anpassat till den egna arbetsmiljön.
Så gjordes exempelvis inom kommun och landsting, staten, byggnadsbranschen, skogen, biltrafikens områden, elfacket, gruvorna, livsmedelsindustrin, stuverifacket, bankväsendet, teatern och grafiska industrin.

Utbildning av utbildare

Utbildningsmaterialet BÄTTRE ARBETSMILJÖ är i första hand avsett för studiecirklar. Utbildningsprogrammet har en betydande omfattning. Det gäller ca 90 000 skyddsombud och nästan lika många arbetsledare.
För att kunna leda de planerade studiecirklarna måste handledare utbildas. Under de första åren utbildades mer än 8 000 för detta ändamål. Allt eftersom dessa var klara satte cirklar igång och skyddsombud och arbetsledare började granska sina arbetsplatser.
Vid utgången av 1975 hade mer än 100 000 genomgått denna utbildning. En utbildning som kommer att pågå under flera år — allt eftersom skyddsombud ersätts och tillkommer.

Uppföljning med vidareutbildning

Det förutsätts att grundutbildningen skall följas av mera specialiserade kurser som rör olika miljöfrågor om vilka skyddsombud, arbetsledare, tekniker m fl behöver ha fördjupade kunskaper. Några exempel är kemiska hälsorisker, olycksfallsbekämpning, belysning och buller.

Företagshälsovården

Till fondens uppgifter hör också att ge bidrag till den utbildning som arbetarskyddsstyrelsen bedriver för personal inom företagshälsovården. Hit räknas kurser för företagsläkare och utbildning till skyddsingenjörer. På arbetarskyddsstyrelsen har dessutom försöksverksamhet med kurser för kvalificerade skyddsombud kunnat bedrivas med hjälp av bidrag från fonden.

Bred information

Fondens stöd till informationsverksamhet vänder sig till breda grupper. Dels genom bidrag till de anställdas huvudorganisationer, vilka använder medlen till konferenser och informationsmaterial om arbetsmiljöfrågor riktade till sina medlemmar. Dels genom bidrag till tidskriften ARBETSMILJÖ som genom fondens insatser kan distribueras kostnadsfritt till samtliga registrerade skyddsombud.

Informationen skall åstadkomma förändringar

Via tidskriften ARBETSMILJÖ ger fonden också spridning åt de forskningsresultat som kommit fram. Genom ett enkelt rekvisitionssystem kan sammanfattningar av forskningsrapporter beställas kostnadsfritt. Fonden söker i dessa sammanfattningar få fram den praktiska betydelsen av forskningen och på sådant sätt att en tillämpning på den egna arbetsplatsen är möjlig.
Pågående projekt redovisas dessutom årligen i en särskild projektkatalog.

Information och utbildning. Här några exempel på olika aktiviteter som fonden bidragit till. BÄTTRE ARBETSMILJÖ med branschanpassade kursavsnitt och uppföljande vidareutbildningsinsatser har spelat en stor roll.

Public opinion has been aroused over the problem of working conditions -- or Work Environment -- and many serious weaknesses have been revealed. They range from accidents, chemical health hazards and noise to psychological and sociological problems. These are just some of the more prominent aspects.

Research has lagged because of insufficient resources and lack of understanding upon the subject and its difficulties. Much has to be done today in many aspects of this problem. The function of ASF -- the Arbetarskyddsfonden, or the Swedish Work Environment Fund -- is clear. ASF supports the practical side of research to prevent industrial and occupational hazards, accidents and sicknesses, and to promote the general improvement of the work environment.

What adds to ASF's strength is that we have the possibility to follow up properly the support we give in the first place. We are not restricted to aiding research only. We are able to help development projects too; projects to launch new methods and processes for creating a better work environment.

Of importance also is ASF's assistance in expanding the training and information programmes. Through this work the experience gained can be passed on to the others who take part in the practical work on safety and environmental conservation.

During the next few years ASF expects its income to be about Swedish Kronor 100 million per year. Such resources make ASF an important tool in materially improving the work environment.

Åke Nilsson
Chairman

Bo Oscarsson
Administrative Director

A growing institution

ASF was founded in 1972.

Two years before that its main lines of activity and its financing were proposed in an official survey. The proposal was well received and given the support of employers' and workers' organizations.

The resources required for ASF were not only to be a reallocation of existing funds for improving the work

environment but also to come from an entirely new source. That was made clear by a government bill introduced in Parliament. ASF started to branch out actively in its first year. Special attention was paid to four areas at the start: accidents, chemical health hazards, shift work, and surveys on the branches of work in relation to the environment. Other areas were added in due course. The scope and character of the environment problem were examined by groups of experts in close contact with the organizations of the labour market. The course of ASF's work over the longer term could thereafter take shape.

As a rule ASF tackled problems of a general nature which affected entire work groups or which somehow concerned large sections of the workers' environment.

But responsibility for the daily environmental problems were to be handled by the companies themselves.

Development work and training

By 1974 ASF had expanded its resources and activities considerably. On the financial side its funds were more than doubled. And its operational sphere had widened. ASF was permitted to support development work in testing new technical solutions. It was also decided that training should receive additional support. Industrial safety officers had been given priority as a group from the start. From 1974 training assistance was extended to include work leaders, technicians and others helping to shape the work environment.

Efficient distribution of information a main task

The result of ASF's support can be seen today in a small but growing number of areas. To do research in work environment questions, and to investigate the new ideas resulting from technical developments as well as from training and information -- all that usually takes time.

A central ASF responsibility is to find ways to distribute the results of work done by researchers and technicians as widely as possible and to make sure that such information is put to practical use in everyday work.

A wide range of contacts

Through its Board of Administration ASF keeps in close contact with the working life throughout the country. There are, at most, eleven members of the Board and they are first nominated by the various sections of the labour market before being appointed by the government.

The Confederation of Trade Unions and the Employers' Confederation each nominate two members. The Central Organization of Salaried Employees, the Confederation of Professional Associations jointly with the Federation of Civil Servants, the Government Collective Wage-agreement Administration, and the Association of County Councils jointly with the Union of Local Authorities each nominate a member. The other three members are appointed directly by the government.

Small secretariat --
wide reference groups

Contacts with the working life is not obtained solely through the composition of the Board but also through ASF's work methods. The secretariat, in Wenner-Gren Center, Stockholm, has a staff of under 30 employees. The drafting of policy and research needs (or work programme) are developed by representative work committees. ASF has formed several guide committees composed of technicians, researchers and general work representatives to cover several environmental areas. These guide committees co-ordinate ASF-supported projects, expose problems for examination, and push project results until they are put to practical use. Budgets and applications are also checked and approved in consultation with researchers and organizations.

ASF on research and development

"... first the kind of research that is likely to lead to practical use in the working life, and the kind of development work which will make sure that new technical solutions will result in practical applications ..."

The original of the above is from the directive issued to determine the main guide lines of ASF's work. It meant that ASF was to participate in projects the results of which were to be directly important in the working life. And that applied to both research and technical development work. In other words, it became possible for ASF to support projects in a wide field; i.e., workers' protection in its existing form as well as in other, newer forms. Enlightment and definite results are needed in many important aspects of the work environment. It is also important that the recommendations made for subsequent action be sumbitted, whenever possible, together with the projects under consideration, so that those who handle these problems in their work can act constructively from the given information.

ASF and training

Industrial safety officers, work leaders, technical planners and others who deal with safety problems, as well as the personnel in companies operating a workers' health service -- these are the groups covered by ASF with its training programmes.

The new Workers' Protection Act has made basic training imperative for about 90 000 industrial safety officers and almost as many work leaders.

Additionally, ASF is using extension courses to train other key groups in the workers' safety field.

As with the work in research and information, ASF will help to co-ordinate the training work. Here it will mostly be necessary to produce study material appropriate for large groups and for various fields of work.

ASF and information

The general aim is to direct information upon the bigger groups in the working life.

ASF's information service comprise several sections.

- Wide distributions initiated and co-ordinated by ASF. Such efforts may apply to information on various environmental aspects; e.g. noise, back injuries, accidents, and so on.
- Support of employees' organizations for information to their members on work environment questions.
- Support of special projects via applications submitted in the usual way.
- Grants to the publication Arbetsmiljö (i.e., Work Environment) to make possible its distribution to all industrial safety officers.
- Information on current and completed projects.

0.075% goes to ASF

ASF's economy is not based on interest derived from huge assets but is a continuous income derived from a work environment charge paid by all employers, such as companies, municipalities and the government.

The work environment charge is a part of the general tax levied upon employers.

In 1974 the work environment charge was raised, and the part allocated to ASF was increased from 0.03% to 0.075% of the total revenue from this charge. Government employers were included at this time. Before that the charge was levied only upon private and municipal employers. In addition to the income from the work environment charge, ASF also receives certain interest payments. The total income received by ASF in 1975 amounted to almost Kr 100 million.

By 1975 ASF was in its fourth year of operations. Just the statement alone, "Kr 100 million and 370 projects", will give an idea of the vast scope of ASF's operations.

During 1975 ASF's Board granted fully Kr 70 million for new projects and projects in the course of development. Of these 370 projects, 270 were new for the year.

Research, development and training account for 75%

The circular chart shows the main division of the ASF budget. Research and development, as well as training, account for the main part; i.e. three-quarters or fully Kr 53 million of the budget allocations.

Of the remaining one-quarter, Kr 11.6 million was allocated to the Arbetarskyddsstyrelsen (or Workers' Protection Board) for expenditures such as: training of personnel in companies with a workers' health service; activities of the regional industrial safety officers; and special projects conducted by the Workers' Protection Board. This amount, in round figures, will be doubled for 1976, mainly because of the fast expansion of regional workers' protection measures in the smaller employment areas.

The final segment of the chart refers to ASF's support given to information and other measures.

Research and development

On the following three double-page spreads are summarized the research and development, or R & D, operations in four main divisions, each of which has a number of sub-divisions.

The bar chart shows the divisions in Kr millions. The four major sub-divisions are: chemical health hazards, noise, development work with product development, and surveys on the branches of work in relation to the environment. The last also covers the biggest number of projects: 136 of all the 212 current R & D projects.

Better work environment

ASF's training support for industrial safety officers and work leaders of many groups dominated the 1975 training

activities. Production costs for the course BÄTTRE ARBETSMILJÖ, i.e., Better Work Environment (or NYA TEMA, i.e., New Themes, as this course is called in the municipal sector), and living-in training costs, as well as supervisors' training costs, were heavy items of expense. The main part of the allocation made on the information side were grants to organizations of employees for distributing information to their members about work environment questions, and to support the publication Arbetsmiljö to enable its distribution to all industrial safety officers.

Grants only to researchers?

Grants naturally are made mostly to universities and research institutes, either to the actual recipient or via a branch organization wishing to have some special question investigated. In several cases grants for practical development work were made towards projects conducted by companies. Grants were often made to closely collaborating researchers and inventors whose ideas ASF deemed worthy of support. However, it is an ASF condition that any project supported must be of general interest and not one likely to remain in a single work area. Contingent repayment is another condition, and this question arises if a project should turn out profitably.

The common aim in both training and information is that wide groups must be reached. So as a rule it is necessary for applications for grants to be supported by workers' organizations, either centrally or at their association level.

Application forms are obtainable from the ASF Secretariat. Applications should be submitted before March 1 or September 1. If desired, contact the Secretariat before submitting an application.

This double-page spread and the two following ones show ASF's support of research and development. The purpose here is not to review individual projects in

detail but to indicate the problems and work connected with the four main areas concerned; i.e., chemical health hazards; physical environment problems; psycho-sociological problems; overlapping programme of the various branches.

500 new subjects yearly

About two million chemical substances are known. And some 500 new chemical preparations are put on the market yearly. The effects which certain substances have upon Man have been reasonably well clarified but a great many chemicals are still incompletely documented or uninvestigated. The effects of long-term exposure, small dosages or low concentrations are areas in particular where there is a lack of information.

The foregoing gives an idea of the magnitude of the task and its problems.

Several lines of development

ASF's activity on the subject of chemical health hazards follow two main lines. One supports research upon the harmful effects of certain substances; the other supports development work upon the elimination technique; i.e., to reduce the health risk in work areas. Even if a substance is only suspected of being a health risk, the elimination technique should be used -- by spot extraction and sealing, for example, or better still, by using new work methods or production processes.

The limited information available about chemical health hazards is reason enough for ASF attempting to discover essential facts. Parallel with current research on the toxicity of certain substances, chiefly conducted at universities and research institutes, ASF is supporting projects for developing measuring and sampling methods.

In the medical field epidemical projects have been started to study the association between normal

health and the substances to which humans are exposed under working conditions.

The elimination technique

In its practical approach ASF is strongly supporting many of the decisions that have to be made concerning the elimination technique. In many studies being made upon the various branches of work, close attention is being paid to the chemical health hazards. These studies include environmental problems that occur in welding, automotive plateworking and car-body finishing, and in the rubber and plastics industries. Another project investigates the solvents used by paint manufacturers, the painting trade and by the graphics industry.

In 1975 ASF participated in over 70 projects in the chemical field and this is almost one-third of all the research and development projects in hand.

Experimental stations

Frequent use is being made of experimental stations to test new or revised technical processes. Practical experiments are carried out at the usual places of work, with the costs normally shared by ASF and the company in whose premises the experimental station is set up. This system is not only being used in the chemical field but in several others as well.

Dangerous substances

The need for research is imperative throughout the chemical industry. Some of the categories upon which ASF is devoting substantial project-funds are heavy metals and volatile organic compounds, of which solvents comprise one group. It is most important to find out and secure the substances that are least active, toxically, but still fully adequate, technically, for the various purposes concerned.

Other types of chemicals in which evironmental factors are concerned are industrial oils and the substances used in plastics production. Pressing decisions have also to be made in problems relating to dust, gases and allergenic substances.

The traditional area of workers' protection concern the physical aspects of the environment; such as noise, lighting, radiation and climate. In this area may also be grouped work-area planning and designing, industrial physiology and ergonomics (the study of human engineering). And to reduce the accident rate is another matter of serious concern.

The physical problems as they affect humans in the work environment cover a vast field. Many problems have been thoroughly researched but much remains to be done. Above all constructive ideas which lead to practical solutions and which can be applied over a diversified range are urgently needed.

The noise group

Noise is the commonest problem in several work environments. One of the sources that confirmed this was the inquiry conducted by the Confederation of Trade Unions some years ago. Noise has been given a high priority from the time ASF was founded. Support has been extended mainly to the finding of new technical solutions that can be usefully adapted to meet the conditions in the different branches of work. In several cases the supporting efforts were made with representative work groups who were responsible for decisions on the information side.

The noise groups which have received or are receiving ASF support relate to the following industries or branches:

Concrete products
Engineering
Food
Printing/graphics
Pulp and paper
Quarrying/stonemasonry
Sawmilling
Textiles
Wood-processing

Considerable work has been accomplished in noise abatement. Much of the success can be traced to information and co-ordination; i.e., to collect the experience acquired and to impart the information effectively, as ASF can confirm.

Over 100 000 work injuries every year

Statistics on occupational injuries state that about 90% of them are caused by accidents during work. And this amounts to about 110 000 accidents every year!

The work group assigned by ASF at the start to check the research done on the subject of accidents reported that accidents seemed "... either to have be overlooked in research work, or else their causes are so familiar or already investigated that no further insight on the subject is needed ...; but when an attempt is made to probe into this matter, extensive or thorough information seems to be lacking. Regarding the statistics compiled about accidents and the conclusions to be drawn, several aspects are only partly explained and the covering information is limited".

ASF considers accident research a matter of great importance. It has therefore encouraged research on a wide scale. In order to obtain information from

abroad and to recruit researchers, ASF has also set up a number of scholarships; accident research is included among them.

Planning the physical environment programme

Many work areas have serious environmental disadvantages because they were never considered from the environmental standpoint during the planning stage.

In 1973 ASF set up a work group to plan and design work areas. The work increased in significance by virtue of the Workers' Protection Act which gave industrial safety officers the right to participate in the planning of new and renovated premises.

The main guide lines for continued research were given in the work group's final report. Among other points the report stated that more comprehensive rules were needed regarding the planning of actual work sites/premises and, in connection with that, the production technique and the work organization as regards machines, hand tools and spatial/physical conditions, were to be carefully considered. All this, according to the report, should be done together with the employees.

To simplify this staff collaboration, check-lists and other aids would be needed in the preliminary examination and other work concerning the plans.

Shift work

How does shift work affect a person mentally and physically?

What effect do working times have upon the family relationship between parents and children, and how do working times affect activities between working hours?

Is there any connection between shift work and non-attendance or the accident rate, etc.?

Several extensive research projects upon the question of working hours, and their mental, physical and social consequences upon the worker, have been started during 1973 -- 1975.

ASF has also arranged with the Central Bureau of Statistics to conduct a preliminary survey on the Swedish people's attitude towards the various forms of inconvenient and irregular working hours. Basic data have been obtained and the information includes statistical breakdowns by age, sex and occupation.

Not only shift work

The work situation for many employees today is determined by production technology. Increased mechanization, automation/rationalization and other advances all greatly influence working conditions and the actual work itself.

A part of the work environment research, from the psycho-sociological aspect, is aimed at reducing the monotony, dependency and the psychological pressure generally caused by work. An important aspect, too, is how work should be organized to increase job-satisfaction.

The feeling of monotony is often aggravated in the worker because of the interdependent worker-and-machine relationship.

Noise and the separation of workers by huge machines weaken human contacts. The efforts necessary here to achieve meaningful results often have to be drawn from various scientific sources.

Work organization

The effects of computer technology upon the work environment have been investigated in a number of projects supported by ASF. One such study showed how different norms used in organizing computer-based systems affected the functioning of various work groups in their environment. The socio-psychological effects of computerization

were also studied. Research also indicated how the relationships between employees, types of work, attitudes, and so on, were influenced when administrative computer routines were introduced.

New work forms, such as increased teamwork in production groups, require a higher learning/training threshold if new work routines are to be assimilated in line with the additional teamwork contacts required among employees. Through the support of ASF, this subject is being studied. The influence that employees have in shaping their own work environment is under investigation, as are the various forms of teamwork in production planning.

Attention is also being paid to absenteeism. Non-attendance, of short or long duration, is being studied in connection with other factors. In another investigation, ill-health absenteeism is taken up in relation to the social situation of the individual, the effects of illnesses prolonged over the years, the pattern of sickness reports, non-attendance due to sickness in connection with accidents, and so on.

The work environment in relation to absenteeism and health is another study under investigation. Here the central theme is the working woman's sociological, medical and psychological situations.

Chemical health hazards

Noise

Technical development work

Surveys of work branches

Allocation of working hours

Work physiology/ergonomics

Work organization

Psycho-sociological environment factors

Climate

Accidents

Work premises and equipment

Lighting/radiation

Workers' Protection Board
Kr 11.6 million

Research and development
Kr 27.1 million

Training
Kr 26.2 million

Information
Kr 5.7 million

The psycho-sociological field is a collective concept for several sub-fields. Under this heading, for example, is one which received the attention of ASF in its first year: The work organization and the question of the effects of shift work. Several studies have revealed the consequences of shift work. Another problem covered in several projects is the rise of automation in the working life, both among collective wage-earners and salaried employees. The work environment of salaried employees has been studied in an extensive research in which 10 000 members of the Central Organization of Salaried Employees and 3 000 from the Professional Association jointly with the Federation of Civil Servants reported on their working conditions.

Surveys of industrial branches are based upon a combination of researchers having different aims, industrial organizations and companies. The starting point in each case has been a general attempt to study all the environ-

ment problems of a branch or exposed group. ASF has taken the initiative and supported a number of work-branch studies. They include branches with many small or medium-size work places, such as hotels and restaurants. An extensive study expected to be completed earliest by 1977 covers working life afloat. A total of 15 ships form the reference "material". Branch studies have been in progress for several years in the sawmilling industry and one environment problem there is noise. At the company, John Neikert AB, at Urshult -- one of the reference companies -- a "house within a house" has been built to reduce sawmill noise.

Information and training. Here are examples of the different activities which ASF has supported. The course BÄTTRE ARBETSMILJÖ, with sections adapted for the various branches of work, has played an important role especially as the course has follow-up extension training facilities.

Seamen, miners, welders and surface finishers, cleaning women, workers in the rubber and paint industries, dockers, greenhouse workers, public sanitation workers, firemen, sawmill workers, hotel and restaurant employees. These are some of the branches of work upon which research has been done or is in progress. Research of this kind is carried out with organizations and companies so that the working conditions of an entire branch or work group can be studied as extensively as possible. The health factors in chemical hazards and the psycho-sociological aspects of the environment are taken in as a part of the working conditions.

Combined scientific approach

Normally the use of several scientific disciplines are needed, the purpose being to examine different environmental factors in order to get a composite picture of the work environment. The most important part of the work,

however, is to assess what technical possibilities there are to make the necessary changes and to make a definite programme of these changes for action to be taken. By making use of reference stations at selected companies, the suggestions and ideas can be checked and converted into practical solutions. Through this procedure, the necessary basic facts wanted for making improvements become available; such information may also prove useful, say, to the machinery suppliers.

A model procedure

Normally a work group is composed of representatives from both employers and employees, and of outside experts. The appointed group guides the project and collaborates with research institutes and the reference companies in order to carry out surveys and to complete the development project itself. The fact that companies permit experiments to be conducted inside their work areas is of invaluable help in the search of effective solutions.

Project guiding group

Research institute

Research institute

Research institute

Reference company

Reference company

Reference company

An important guide in branch-type surveys is to produce the basic facts and programme of action for the smaller companies. Much effort, in the way of information and training work, is required in order to reach them and to create a working response.

More than Kr 50 million

Training and information are important parts of ASF's work. Many research and development projects must be followed up by information and training so that the results can be made known and applied. Many other valuable research projects will be completed within the next few years and information must be distributed still more effectively. However, most of the training and information efforts made up to the present have not be tied to individual research and development projects. The work done so far has been mainly to supply basic information to the larger groups, such as the work leaders and industrial safety officers. Since ASF started in 1972 over Kr 50 million have been invested in information and training.

Workers' Protection Act creates need for more training

The section of the Workers' Protection Act that became effective in 1974 meant that an industrial safety officer was required in all places of work having more than five workers. To help the industrial safety officers and work leaders in their new responsibilities and to enable them to deal with existing work-environment questions, ASF took the initiative of producing a comprehensive training "package", BÄTTRE ARBETSMILJÖ (i.e., A Better Work Environment). This educational training material was prepared by the Labour Welfare Council in collaboration with the various sections of the labour market.

It was prepared for use as a basic course in work environment questions, and because the whole labour market would be using it the examples chosen were taken from widely different work environments. To make the course as realistic as possible, ASF also provided funds to the branches that wanted to supplement the basic course with material adapted to their own work environments.

Such funds were provided, for example, to municipalities and county councils, and to the government services,

as well as to the appropriate organizations of the building trade, forestry work, motor transport, the electrical branch, mining, the food industry, stevedoring, banking, the theatre world and the graphics industry.

Training the trainers

The training material BÄTTRE ARBETSMILJÖ is primarily intended for study circles. The training programme covers a wide range: about 90 000 industrial safety officers and almost as many work leaders.

To be able to take charge of the planned study circles, instructors must receive training themselves. During the first year over 8 000 persons were trained for this purpose. Soon after the instructors were trained, the study circles began to function and the industrial safety officers and work leaders began to check their work areas.

By the end of 1975 over 100 000 persons had taken the course. This training programme will continue to operate for several years as succeeding groups of industrial safety officers take over from their predecessors.

Follow-up and extension training

It is expected that basic training will be followed by more specialized courses upon different environment problems where industrial safety officers, work leaders, technicians and others must have information. Some of these advanced courses will be on subjects like chemical health hazards, accident prevention, lighting, and noise.

Company health service

Another part of ASF's responsibilities is to support the training conducted by the Workers' Protection Board for company employees working on health service. Under this classification are courses for company doctors as well

as training for safety engineers. Also functioning under the Workers' Protection Board is an experimental section with courses for qualified industrial safety officers. This section operates with funds supplied by ASF.

Information far and wide

ASF's support of information activities covers a wide field. One form of support is by supplying funds to the top organizations of employee associations who, in their turn, use the funds for conferences and information material about work environment questions of interest to the members/employees. Another form of support is providing funds for the publication of ARBETSMILJÖ which, because of ASF's aid, can be distributed free to all registered industrial safety officers.

Change and progress through information

ASF also publishes information about research results through the publication ARBETSMILJÖ. Summaries of such research results can be ordered, free of charge, by using a simple requisition system. By this distribution of research summaries, ASF expects to highlight the importance of these results and to have them applied in the various areas of work.

There is also a special project directory in which current projects are reviewed every year.

Members of the ASF Board of Administration. Seated (from left) . . . . . .

Standing (from left) . . . . . .

Absent members . . . . . .

During 1975 three-quarters of ASF's budget were grants allocated to research and development, and to training.

Sections of considerable importance in the R & D programme are the chemical health hazards, noise problems, surveys of work branches, and technical development work. Columns indicate grants alloted to the different research areas. Funds granted in 1975.

What kind of chemical health hazards are car and industrial painters exposed to, say, from solvents and paints? Over 90 places of work are currently being investigated. The survey, which is managed by Bengt Knave, Laboratory Director of the Workers' Protection Board, and Prof. Lennart Widén of the Karolinska Hospital, has one section investigating health hazards in work and another investigating the possible harmful effects of solvents. The purpose of the survey is also to record long-term changes.

From studies made through the Workers' Protection Board the health hazard limits have been lowered for a number of solvents, including toluene. Prof. Irma Åstrand, who is supervising this work, has also taken part in the test-cycle experiments. It was most important to find out the work-load limits because ten times as much air is needed in heavy physical work than in light.

Dust is an environment problem in the plastics processing industry. To test the feasibility of a technical proposal, ASF supported a reference plant at AB Trelleborgsplast, Ljungby. About 25 work places were connected to a central vacuum-cleaning installation. All hand-tools were fitted with vacuum-suction covers that reduced the volume of dust by about one-third.

Planning and designing work-areas. ASF has followed up this in different ways. In one, the main guide lines for the

project were suggested by a work group. The idea in a project at the Arla Milk Distribution Center, Stockholm, is to develop procedures that offer employees greater opportunity to influence planning.

One of the commonest places in which to work is the driver's or operator's cab. Temperature is not the least of the problems here. The interior is often unbearably hot in summer. ASF has therefore decided to support research and development in this matter. The Agricultural Technical Institute, Ultuna, is conducting a survey to find out the basic data on acceptable heat and the effectiveness of various heat-dispersal methods. This survey covers not only heat but dust problems too, and the survey extends from machinery used in farming and forestry to contracting work and industrial operations. At the Arvika plant AB Termofrost has developed an air-conditioning plant which the driver or operator can use to control cab-temperature directly over a wide hot-cold zone, with cab-doors closed to eliminate dust and noise.

Hand injuries are a common work complaint. Gloves sold for working purposes are far from ideal. A survey has been made by the Institute of Anatomy at Gothenburg University. Based on some of the survey information, Per Lars Jos, Malung, has designed an experimental range of work gloves. These gloves protect the hands from injuries caused by cutting, friction, fire and crushing. Attempts are being made to develop a suitable glove-material.

Preparing the gate or riser is a preliminary step in casting at a steelworks. Hollow bricks are placed in a form and during the work the operator is exposed to intense heat from the forms and by his own movements. A project to help the gate layers in their plight is being conducted by Prof. Ulf Åberg, STU. In one of the project ideas being tried at SKF, Hällefors, a model frame constructed for the actual

bricklaying operation helps to simplify the work considerably. By using this brick-inserting frame, the operator can work upright.

Wenner-Gren Center
Sveavägen 116, 11th Floor
S-113 46 STOCKHOLM
Telephone: (08) 15 13 00

Production: PR System AB, Gothenburg. Erik Järhult and Leif Nelvin.
Chief photographers: Bengt Sahlén, Gothenburg and Göte Tarle, Bromma.
Printed by Risbergs Tryckeri AB, Uddevalla.
FOR DISTRIBUTION ABROAD.

==========

Presentation of the Swedish participants in the

F R E N C H - S W E D I S H M E E T I N G

In Stockholm 7:th to 10:th of September, 1976

Arranged by: The Swedish Work Environment Fund

Association Franch-Suédoise pour la Recherche, Stockholm

Delegation Generale à la Recherche Scientifique et Technique, Paris

Urban Kjellén, Civil Engineer
National Defence Research Institute
Box 416
S-172 04 SUNDBYBERG

Age 27. Received the degree of Civil Engineer in 1971 from the Department of Physics of the Royal Institute of Technology. Since 1972 a research officer at the Department of explosives Technology of the National Defence Research Institute. Works since 1973 on a project on accident prevention in the explosives industry. The project includes a survey study of the work environment and the safety organization in the Swedish explosives industry and the identification of safety problems and the development and introduction of safety measures at three places of work.

Problems of interest for discussion:

1. The study of disturbances:
   a) the organization of the reporting of disturbances in different applications and in different types of production.
   b) the analysis of reported disturbances in a system as a basis for the development of safety measures and decisions of priority.
   c) the use of the intensity rate of different types of disturbances in the valuation of the effect of safety measures on the accident risk.
   d) the study of disturbances in accident research in e.g. studies of risk factors. Research results?

2. Results from studies of the consequences on the accident risk of different characteristics of the work environment such as: degree of mechanization, the control of the repetition rate and the quality of the work (by technological and organizational means), opportunity of social contact etc.
   The application of this type of results in the planning of changes in existing places of work and in the planning of new ones. Conflicts between different types of safety measures, e.g. increased control of the work behaviour and improved psychological climat.

3. The safety organization:
   a) alternative types of organization
   b) the effects of industrial democracy on the accident risk

4. Safety education for newly-appointed and experienced employees. Results from the valuation of different types of education programs (affect on knowledge, risk-taking etc)

5. Pre-requisites and difficulties in the introduction of accident research results in industry.

Elisabeth Lagerlöf
National Board of Occupational Safety and Health
Fack
S-100 26 STOCKHOLM, Sweden

Psychologist at the National Board of Occupational Safety and Health. Has studied accidents in forestry, especially through near-accident reporting, has been secretary general of the Swedish Committee of Occupational Injuries Statistics 1973-1976, and is now working on her thesis.

Main interests:

1. Occupational injuries statistics
2. Methods in accident research - especially near-accident reporting
3. The individual's concept of risk/subjective riskestimation/risk-taking
4. The organization of the safety work in the industry

Nils Lundgren ,Professor, MD
Head, Department of Occupational Health
National Board of Occupational Safety and Health
S- 100 26 STOCKHOLM, Sweden

The role of the Department within the National Board is illustrated from the attached leaflet ("L´administration nationale de sécurité et d´hygiène du travail").

The main tasks of the Department consist of research, training and consultant work.

Current research projects are shown in the attached list (dated 1975-12-31).

So far, accident research performed in the Department has been mainly concerned with analysis of near accidents (Lagerlöf), socio-psychological aspects (Lagerlöf, Baneryd, Sundström-Frisk), payment systems and accident risks (Sundström-Frisk), and physiological and ergonomical studies of personal protective devices (Hansson, Holmér).

As a complement to the already existing resources for accident research, a section for technical accident research is just being created in the Department, under the leadership of an Associate Professor. Plans are at present being developed for a research programme to be run jointly by this new section and specialists from other fields, such as work physiology and psychology. The selection of problems to be taken up is being made in cooperation with the Supervision Department of the National Board. The research programme is intended to be integrated with a follow-up programme in which results will be utilized as a basis for occupational safety standards, etc.

Bo Pettersson
Skogsarbeten (Logging Research Foundation)
Drottninggatan 97
S-113 60 STOCKHOLM, Sweden

Mr Bo Pettersson, Forester, is research leader for all projects in the "work environment" field at Skogsarbeten. Together with Prof Bengt Ager he is heading the project "Increased safety in forest work - an action programme for Swedish Forestry", sponsored by the Work Environment Fund. The aim of this project is to decrease the number of accidents in forest work as well as the severeness of the accidents. Forestry is one of the branches topping the list of accidents per million working hours.

The project aims at decreasing the accident rate through improved production technique - better felling equipment, better design of machines, improved protective clothing etc - and also better organization of safety work, i.e. better involvement of the workers in the safety job. In order to reach better involvement by the forest workers a near-accident-reporting routine and work-place meetings on safety in felling will be introduced in Swedish forestry.

The project has a budget for the first year of one million Swedish Crowns and will run over a four year period.

Carin Sundström-Frisk
National Board of Occupational Safety and Health
Work Psychology Unit
Fack
S-100 26 STOCKHOLM, Sweden

Master of Science 1976. Since 1973 psychologist and research assistant at the National Board of Occupational Safety and Health, Stockholm. Working with field and survey research connected with behavioural and motivational factors bearing on worker safety in the logging operation.

Main writings: Factors influencing the use of personnel protective equipment; work behaviour in situations critical from a safety point of view.

At present working on a follow-up study, where the effects of changes in renumeration systems are being evaluated. The main variables to be studied are patterns of accidents and injuries, quantity and quality of work performance and psychosocial conditions.

Problems of interest for me to discuss at the workshop in September.

1. Learning processes

   How to teach people that something is dangerous when their own experiences tell them it is´nt, or put another way: what happens when a person takes a risk and no accident or injury follows?

2. Attitudes to safety of the management and supervisors

3. Evaluation of safety programs

Leif Svanström, B A; M D
Landstingets Hälsovård
Sjukhuset
Sjukhusgatan
S-541 00 SKÖVDE

Doctor's thesis: Epidemiology on accident in defined community.

Main scientific interest: Epidemiology and preventive medicine, mainly occupational Health and accident prevention.

Scientific production: About 50 articles in the field of social and preventive medicine.

Present status: Physician at Department of preventive medicine, County of Skaraborg, Sweden, mainly responsible for occupational Health in this area.

Present work in occupational accident prevention: Project-leader for a project which tries to unite epidemiological and system-ergonomic approaches in a theoretical modell for further research in the field as well as practical application in daily safety-work in industry.

Ulf Åberg
Royal Institute of Technology
Laboratory of Industrial Ergonomics
Drottn. Kristinas väg 47
S-114 28 STOCKHOLM, Sweden

Graduated as an electrical engineer from the Royal Institute of Technology, 1945, Ph.D.(tekn.lic.) 1959 (thesis on the intelligibility of speech)

Scholarship for studies at the Massachusetts' Institute of Technology, Cambridge, Mass., of information theory, speech transmission and acoustics, 1949-50.

Guest researcher at the Haskins Laboratories, New York City, 1957-1958 (speech perception).

Member of the Council of the Ergonomics Research Society of England since 1975.

Now professor of industrial ergonomics at the Royal Institute of Technology, Stockholm, and at the same time director of the Laboratory of Industrial Ergonomics.

Main interests in industrial safety and accident prevention research:

1. Theoretical considerations of the origin of accidents
2. Profylactic design of production systems

Three of the presentations are still missing but will be sent over as soon as they arrive. The three remaining participants are:

Jan Kronlund
University of Linköping
Department of Economics and Management
Faculty of Technology
S-581 83 LINKÖPING, Sweden

Carl Lager
Royal Institute of Technology
Fack
S-100 44 STOCKHOLM, Sweden

Håkan Täljestedt
Uddeholms AB
S-683 05 HAGFORS, Sweden

HOUSING AND SERVICE FOR THE HANDICAPPED IN SWEDEN

AN ACCOUNT OF WHAT THE FOKUS SOCIETY DOES TO PROMOTE INTEGRATED LIVING CONDITION FOR THE SEVERELY DISABLED PERSONS

BY

SVEN-OLOF BRATTGÅRD

FOLKE CARLSSON

ARNE SANDIN

THE FOKUS SOCIETY
VÄSTRA HAMNGATAN 24-26, S-411 17 GÖTEBORG, SWEDEN
Tel: 031/132112, 132114, 133113

THE FOKUS SOCIETY AND ITS OBJECTIVES

The 1960's was a decade of greatly improved facilities for the rehabilitation and education of severely handicapped children and teenagers. However, this has not been matched by a similar effort to provide physically impaired young poeple with housing and services. Up to now many of these persons have had to spend their lives in isolation and idleness at nursing homes or institutions for the chronically sick whenever their parents have been unable to look after them. The mere suggestion that they might manage homemaking on their own used to be widely considered unthinkable.

In 1964 the Fokus Society was established in Sweden. Its objective is to help the younger ambulant impaired, (those who are partly or wholly dependent upon technical aids and personal assistance in order to facilitate moving about, personal hygiene, dressing and undressing, shopping, cooking and transportation), with housing, services and guaranteed care so that they can live in their own homes under the same conditions as other people and not be reduced to isolation and idleness at nursing homes and sanatoria or have to stay on at the parental home, with all the burdens that this implies.

What Fokus had in mind was to include apartments for the young handicapped in ordinary rental housing. They would be designed to enable the handicapped person to manage independently as fas as possible. The dwelling units would be intended for single as well as multiple occupancy, even though emphasis would be put on one-person apartments. Personal assistance would be available on a 24-hours basis. There would be direct access from the apartments to common-use spaces. Eligibility for accommondation would extend to handicapped persons from all over Sweden.

The apartments were to be centrally placed in ordinary residential areas and in ordinary structures mixed with apartments for the non-handicapped. By locating the apartments in communities with relatively good employment opportunities and full-fledged educa-

tional programs, it would be easier for the handicapped person to get and hold onto a job.

The Fokus Society seeks to encourage work contributions and provide capabilities to enable the tenants to avail themselves of public resources on the labor market. Fokus interprets its mission in terms of helping the handicapped person in his whole situation, the better to enable the tenant to lead his life without unnecessary restrictions.

In line with this objective, Fokus has formulated certain basic principles as follows:

- The handicapped person shall have the right to choose his dwelling irrespective of where he lives.
- The handicapped person shall be permitted to live in an ordinary residential environment and use his dwelling under the same conditions as others.
- The handicapped person shall feel secure on the strength of access to personal service.
- The handicapped person shall be given all necessary support to enable him to choose, obtain and retain employment.
- The handicapped person shall be given opportunities to engage in meaningful pursuits.

Target: the severely disabled - a small, neglected group

Hence the primary target group at which Fokus aimed consisted of younger persons suffering from severe locomotor disabilities, a group that must have technical equipment and personal assistance in order to cope with the activities of daily life (ADL), such as dressing and undressing, visits to the lavatory, cooking, shopping etc.

In an investigation that covered the whole of Sweden (about 8 million inhabitants) Gunnar Inghe and Inga-Maj Juhlin (Soc. Med. tidskr. 6:1968) found about 1,000 severely disabled persons between

16 and 40 years of age who needed apartments of the Fokus type. In addition there was a group of about 1,000 "borderline cases". The investigation showed a preponderance of severely disabled in rural areas and an underrepresentation in urban areas. This is explained by the fact that handicapped youngsters cannot migrate as much as others to the more attractive cities and towns. A higher proportion of the severely disabled were compelled to stay with parents or realtives where they could be cared for or, failing that, to live in a nursing institution. About 20 % of the youngsters deemed capable of living in Fokus apartments were receiving institutional care. Many of those who stayed with their parents were living in unmodern and inconvenient apartments.

Organization of the Fokus Society

Fokus is a nationwide organization with a central directorate and local executive committees. The national organization is mainly responsible for finances, cooperation with the authorities, planning, building projects and general counselling. The sponsors at this level are official bodies and various organizations of the handicapped.

The Society obatined its working capital of about Skr 11 million from a fund-raising campaign, the "Red Feather Drive", run on April 3, 1965. A magnificent result could be achieved thanks to the participation of radio, television and the Swedish Lions. The intention has been to spend these money and gradually let the community at large take over the financial responsibility for providing the severely disabled with housing and service.

Fokus carries on most of its practical work through the local executive committees, whose membership represents organs of government, organizations of the handicapped, the Society and the tenants. A typical executive committee will include representatives of the local social, medical and occupational welfare services, of the handicapped and of the central directorate. Acting in consultation with the local authorities, the local executive

committee is responsible for staffing, program supervising and general counselling.

Program planning and dwelling design

The investigation referred to earlier was carried out under the auspices of the Fokus Society. This census of the severely disabled in Sweden made it possible to plan activities in the large and assign priority to the most promising localities. On the basis of the funds that had been made available, it was deemed feasible to set up programs at 14 localities distributed over the whole country. All told, this effort could meet about one-third of the known need.

Guidelines for the design of dwellings and the close-in environment were drawn for Fokus by a special task force consisting of architects, rehabilitation experts, consulting engeneers (heating, ventilation, sanitation and electricity) and handicapped persons. The task force sought to plan specially designed dwelling units which permitted maximum flexibility to accommodate individual needs. It was also called upon to plan the common-use facilities that might be needed: rooms for use in emergencies, for the care of clothing, for washing-up, etc. This part of the project included the design of an emergency signal system that could be used by the handicapped.

The task force presented the first draft of a conceptual scheme in the spring 1967. This proposal was then reworked into finalized shape in the following year. Its title: Principles of the Fokus Housing Units for the Severely Disabled . This manifesto has formed the basis for planning the different Fokus units. It is published in German and English versions.

With the task-force report as the starting point, work began on the design of flexible kitchens and bathrooms. Interior fittings such as cabinets and work counters are manufactured to Fokus specifications by designated suppliers. In Germany, for instance,

they are produced by Berufsförderungswerk Hamburg G.m.b.H. Here Fokus does not confine itself to quality control of the production process, but also regularly informs the produce' of the experiences that are gained.

Fokus undertakes to select tenants for the apartments. In addition, the local executive committees are brought in to ensure that service personnel are available.

A fundamental principles of Fokus planning is that every tenant shall have his own apartment. A single "all-purpose" room, even if equipped with kitchen facilities and the like, cannot be accepted as a long-term solution of the handicapped person's housing problem. All units are planned for the severely disabled from the outset. The recommendations drawn up earlier by the Fokus planning group have been followed.

Fokus has apartments for families as well as individuals. Figures 1-3 illustrate three floor layouts from Mölndal near Göteborg. Generally speaking, floor layouts are the same at all localities even if specific allowance has to be made for structural technicalities. Some dwelling plans, especially those for one-person accommodations, provide for an "all-activities room" (Fig. 1). The rationale here is to have a dwelling which puts the tenant at the center of activity on every occasion, enabling him to keep in touch with everything that happens round about him, whether he be in bed, sit in the kitchen or lounge on a sofa or armchair. All interior fittings are detachable, which permits the tenant to shape his dwelling as he sees fit.

All interior fittings are adjustable for height, both in the kitchen and bathroom. Maximum livability is thereby put in the handicapped's hand, regardless of whether he is tied to a wheelchair or uses crutches.

Various technical amenities are built into the apartments. Thus the electrical controls are assembled in small movable boxes that

can be placed next to the bed, in the kitchen or on the wheelchair. In the latter instance, the switching device is radio-controlled so that the handicapped person can move freely in the room. When the installed equipment is activated by the switching device, the tenant can open doors, call for help, talk in the house telephone, turn the lights on and off, and so on. All apartments are connected to on-duty personnel by intercom. As a rule, too, the tenants have their own telephones.

All Fokus dwelling units adjoin common-use spaces. These facilities are open to all tenants, handicapped as well as non-handicapped. There are recreation rooms with TV sets and communal dining rooms with kitchen for those who prefer to eat the day's main meal in the company of others. Separate rooms are usually set aside for physical training and exercise, each containing items of equipment suited to individual capabilities. There are craft activity rooms, likewise fitted with specially designed equipment.

An adjunct of most Fokus units is a hygienic department, which has bathing equipment especially adapted to the severely disabled. Many places also come with a sauna. Separate provision is usually made for a clothing-care room in which suitably designed washing machines, dryers and mangles are installed. Plans are in hand to build garages for wheelchairs used outdoors. Wherever feasible parking stalls for cars are provided as an integral part of the structure. In other cases garaging consists of carports equipped with electrical car-heaters.

Service personnel are provided with staff rooms as well as with an office or on-duty room.

Fokus has striven to obtain a central location for its apartments wherever possible. This makes it easier for the tenant to take part in community activities, develop interpersonal relations do his own shopping, etc.

The full-care service - scope and organization

Once a severely disabled has been provided with a dwelling adapted to his handicap, it is just as important for him to enjoy a function-worthy personal service. The handicapped tenant in a Fokus unit will have that need met by the Society's staff, over and above the service he may obtain from the public home-help program.

Many handicapped persons, especially the severely disabled, may need round-the-clock service for all functions which relate to life's daily rounds. The most salient needs have to do with dressing and undressing, help with personal hygiene, getting food and shopping. Moreover, the handicapped person who lives in his own dwellingneeds help with cleaning, bedmaking, laundry etc. Provided these tasks are not too heavy, many of them can be performed by home helps of by another service organization. However, owing to the need of the severely handicapped for 24-hour service as well as the size of assisting staff required, this program differs from that traditionally associated with home nursing. That is why we have elected to call our program the full-care service.

The starting point for any assessment of the need for such service must be what the handicapped person can do on his own and the time it takes him to do it. Consideration must also be given to all technical arrangements that can reduce the need for service and make the handicapped less dependent on others for help.

Service for the handicapped is cast in organizational modes that differ slightly from one locality to another. This reflects the different philosophies prevailing among county councils and municipalities. The basic principle has been to allot the handicapped person as many hours of help from a home samaritan as though he lived in a so-called interspersed invalid dwelling. County councils and municipalities have generally maximized the number of hours at four per day. For the severely handicapped with whom Fokus is concerned that is not enough. The vast majority must have access to personnel who can help them at different times of the day. To be able to meet that need, the Fokus units employ

personnel who are in duty round the clock. This enables the handicapped person to receive help whenever he wishes, whether it is to go to the toilet, get undressed for bed or have his sleeping position changed. Fokus employees also assist home helpers whenever two people are needed to do heavy lifting or the like. Moreover, the home-help program cannot easily find the manpower needed to work on weekends, which means that Fokus personnel must assume the greater part of the workload.

Several reasons prompted Fokus to adopt a full-care service, which may be defined as a system of personal assistance and service during certain hours, with access to on-duty personnel in between. Most important of all, the tenants themselves have found this arrangement to be appropriate. The handicapped person has someone who takes more direct care of his dwelling and his service needs, someone who knows his habits, where he keeps hos clothes, what he wants to eat, and so on. This makes it unneccessary to initiate every new assistant in all the details.

Another reason is that a system based on personnel who comes from the outside counteracts tendencies towards "institutional thinking", i.e. by analogy with commitment to a hospital, nursing home or the like.

A third reason it that this system prevails on the handicapped person to assume responsibility for himself. He knows how many service hours he can get and must himself allocate them properly.

An important aspect of the full-care service is the attitude of personnel. Fokus staff must be open-minded and avoid all tendencies to treat the handicapped person as a patient. It is also necessary to show respect for the handicapped's right to independence and to management of his private affairs.

A major function for the severely disabled is the ride service. A well-functioning ride service is necessary of the handicapped person is going to be able to engage in different activities offered

by the community and to get into contact with others. The ride service is being built up. Although in operation at all localities where Fokus is active, it has not yet developed in some places to the desired extent. One trouble with the ride service is that it is available in several localities only at limited times of the day.

A progress report for 7 localities

With the cooperation of the Fokus Society, flexible dwellings adapted to the severely disabled have been planned at 13 localities. The Society's policy is to get in touch with the builder-developer before a residential area is planned and to rent about 15-25 apartments, provided these have been planned to Fokus specifications and the structure is otherwise handicap-adapted. Fokus has also rented suitable spaces for the pursuit of hobbies, physical training, staff accommodation, etc.

As of 1971 the program had been under way for more than one year at seven localities. Fokus therefore felt it appropriate to report on progress in a booklet entitled "Housing and Service for the Severely Disabled".

All structures in which Fokus apartments are housed are mortgaged on government terms. This assures the tenants of an equitable basic rent. To cover the extra costs which arise from adapting the apartments to handicap occupancy. government subsidies are payable at up to Skr 15,000 per apartment. By and large this amount suffices for a one-person dwelling, but it has proved to be a bit on the low side for a larger unit occupied by a severely handicapped tenant. Accordingly, certain extra costs of dwelling adaptation have had to be added onto the rental costs. The costs of renting common-use facilities are distributed among the apartments after an established formula.

Each tenant has been furnished with technical devices, paid for out of government subsidies, by the authority in charge of the medical services (usually a county council).

The seven localities encompass a total of 141 apartments, which break down by size class as follows:

1 room and kitchen	76 (54 %)
2 rooms and kitchen	40 (28 %)
3 rooms and kitchen	25 (18 %)

The one-room apartments have floor areas ranging from 43 to 48 square metres. In Kalmar the floor area is 38 m^2. The two-room apartments range from 55 to 79 m^2, the three-roomers from 80 to 96 m^2.

Those 141 units are occupied by 174 persons, of whom 151 are handicapped. About half the dwellings are 1-room apartments of 43-48 square metres. The two-room apartments have an area of 55-79 m^2, the 25 three-roomers have 80-96 m^2. At all localities the apartments adjoin common-use facilities such as lounges, hobby rooms, specially equipped laundries and bathrooms training rooms, and on-duty and staff rooms. The annual price per square meter of floor area varies between Skr 82 and 116. The cheapest rent is to be found in units for which tenancy is subject to a down payment. The costs of common-use facilities, which amount to about 30 % of the total, are added to the dwelling rent. To judge from this investigation, the rental cost per square meter of well-equipped and high-standard apartments for the handicapped does not appreciably exceed the costs of an ordinary dwelling in the general housebuilding output. Notwithstanding the municipal housing allowances and the share put up by the tenants, the true rental cost is not covered. As of 1971 the Fokus Society underwrote about 36 % of the rental costs, the municipalities 46 % and the tenants 18 %.

The full-care service is usually organized to permit the handicapped tenant to receive public home-help for a specified number of hours per day or week under municipal auspices. This limited time does not meet the needs of severely disabled persons. The program involving home samaritans and/or home nurses is augmented

by a staple service which functions on a 24-hour basis and is staffed by employees on the Fokus payroll. The cost of the overall full-care program -- whether administered by the municipality or by Fokus -- varies from Skr 12,000 to 18,200 per handicapped person and year. For 1971 the average was Skr 16,200. Since the financial circumstances of nearly all the handicapped are such as to rule out charging for public home-help in accordance with established Swedish practice, no charges are levied for the service provided by the Society.

The allocation of full-care service costs is as follows: Fokus 56 %, municipalities 15 %, county councils 25 % and central government 4 %. The county councils contribute to home nursing, while the central government helps finance the municipal home-help programs and a nursing service for students out of the ordinary State subsidy.

The total cost of housing and service in a Fokus apartment averages Skr 22.600 per year and handicapped person. This figure may be compared with the public costs of treating the chronically ill at clinics or old-age homes in similar localities. The costs per bed range from Skr 42,000 to 60,000 for a chronic-care clinic and from Skr 19,400 to 30,700 for an old-age home. Reservations must always be attached to comparisions of this kind, since the different places vary widely in the quality of care and the residential environment they offer.

Earlier situation of the tenants

An analysis of the situation for handicapped persons before they moved to Fokus apartments discloses that about 34 % came from the neighborhood, while 66 % were from other localities. Most of the handicapped, 48 %, had formerly lived with their parents, while 24 % had been at institutions, nursing homes, chronic-care clinics or the like.

After moving into the Fokus units the handicapped took greater part in work and studies. Here, however, there was a time lag, which

reflected the difficulties of finding jobs during the short period that the program had been in operation. Even so, 45 % were in employment or education one year after moving in.

The Fokus dwellings made it possible for more handicapped to move together to form families with handicapped or non-handicapped persons. 36 % of the tenants cohabited or were married.

Of the handicapped tenants 77 % were tied to wheelchairs. More than half needed help with dressing and undressing, and one-third with the daily hygiene. Nearly one in five (18 %) needed help to change sleeping position during the night.

Thus the handicapped tenants in Fokus apartments comprise a group of severely disabled, who are utterly dependent on a full-care service that functions round the clock. The Fokus program has enabled them to live a more active and independent life under secure conditions. Moreover, the program also permits the handicapped person to settle down wherever he likes. He is no longer shut in by provincial boundaries. He may dispose if his dwelling on the same terms as others and personal service is guaranteed to him. As a result he is also given new opportunities for employment, education and leisure activities.

As a tenant of Fokus the handicapped person derives special benefits. For some tenants the Fokus apartment becomes a step in the rehabilitation process leading to a more ordinary dwelling. Because of the Society's nationwide activity, a tenant is also enabled to move from one Fokus locality to another, which brings him closer to friends and relatives or to places with better job openings. During the vacation season, morover, a Fokus tenant may switch flats temporarily with a handicapped person at another locality. Both then enjoy access to the home welfare service at the new "holiday resort". The tenants may also provide guest accommodation over a weekend or so to another handicapped person, who likewise qualifies for service.

Problems of the severely disabled a community concern

The Fokus program, together with the investigations that Fokus has sponsored, proves that the severely disabled in need of constant care are a small, neglected group. Most of them have been handicapped from birth, which accounts for deficiencies in their education, and after finishing school many have been reduced to living on disability pensions.

Each year 40 or so handicapped persons in Sweden may be expected to enter a situation which generates the need of a dwelling with service according to the Fokus system. So far their problems have not received attention from the body politic, which is more inclined to deal with the most acute cases by committals to nursing institutions or chronic-care clinics. None the less, Fokus has shown with its program that arrangements to house and care for severely disabled persons are indeed feasible at very reasonable expense. These persons need no longer be constrained to stay on in parental homes or become inmates of institutions. These handicapped, too, deserve the right and the opportunities to a home of their own. Although the Fokus solution opens new vistas for the severely disabled, it is also an advantageous solution for the community.

The community must also assume responsibility to satisfy the legitimate demands of the severely handicapped group here at issue, demans for homes they can call their own as well as for guaranteed service.

Figure 1

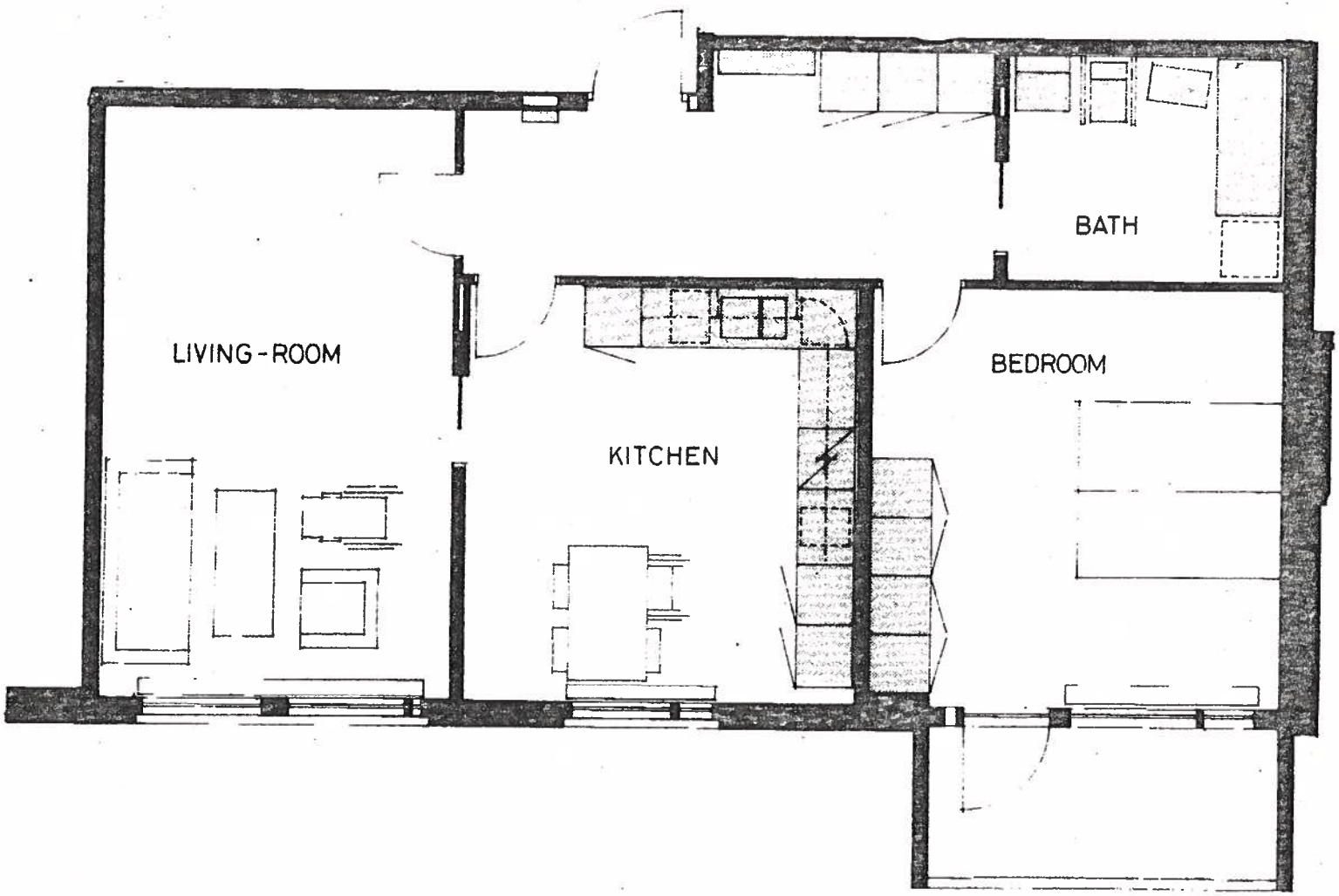
Fokus apartment, 1 room and kitchen, 48 square meters, Mölndal.
The one-person apartment is planned as an all-activities room.

Figure 2

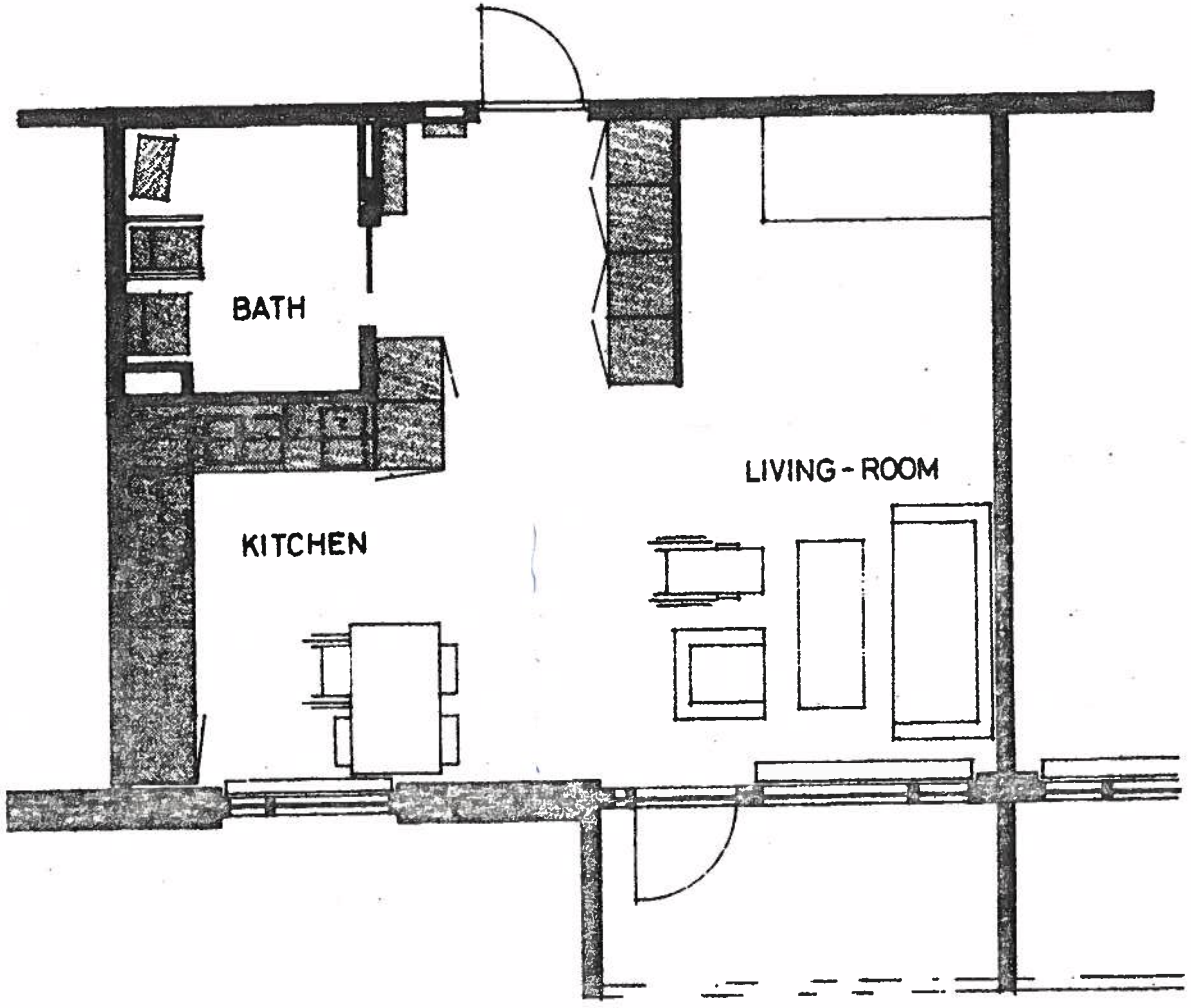
Fokus apartment, 2 room and kitchen, 76 square metres. Mölndal.
The apartments are flexibly furnished. Kitchen and bathroom equipment is adaptable to the tenant's needs.
Sliding doors take less space and are easy to maneuver for the wheelchair occupant.

Figure 3

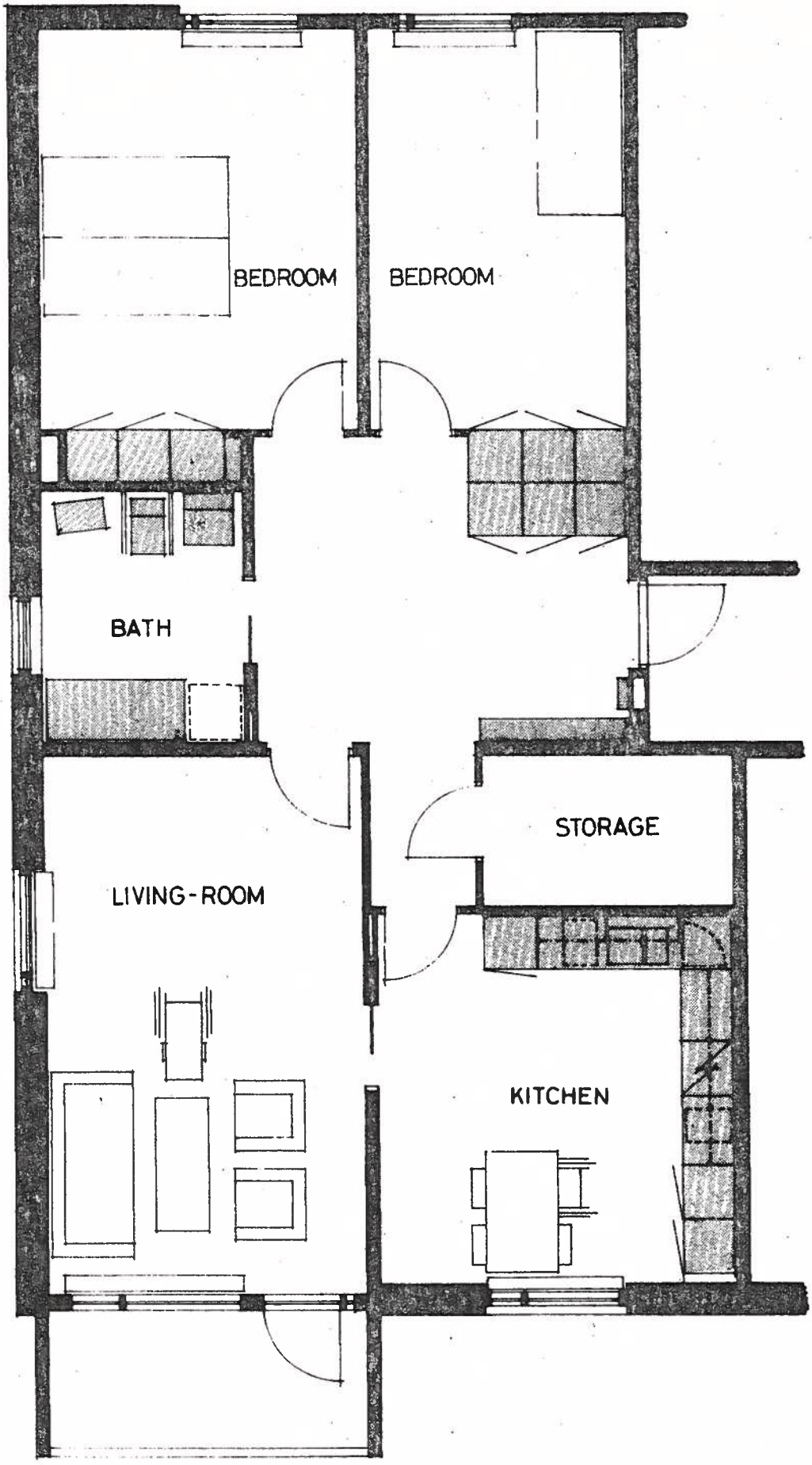
Fokus apartment, 3 rooms and kitchen, 96 square meters, Mölndal.
Multi-person flats offer greater opportunities for fellowship and family formation.



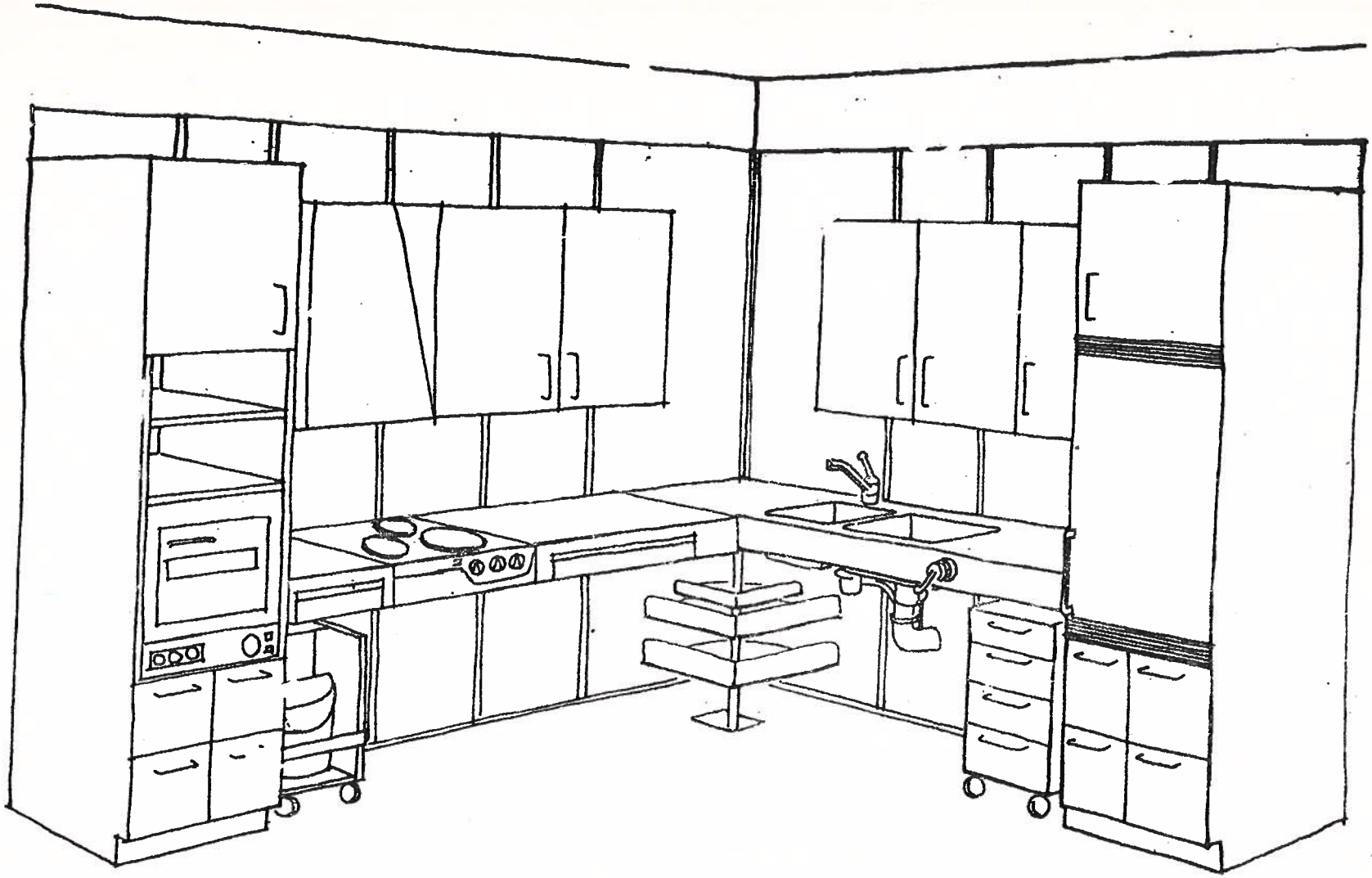
FOKUS FLAT 2 Rooms and kitchen 76 m² MÖLNDAL



FOKUS FLAT 1 Room and kitchen 48 m² MÖLNDAL



FOKUS FLAT 3 Rooms and kitchen 96 m² MÖLNDAL



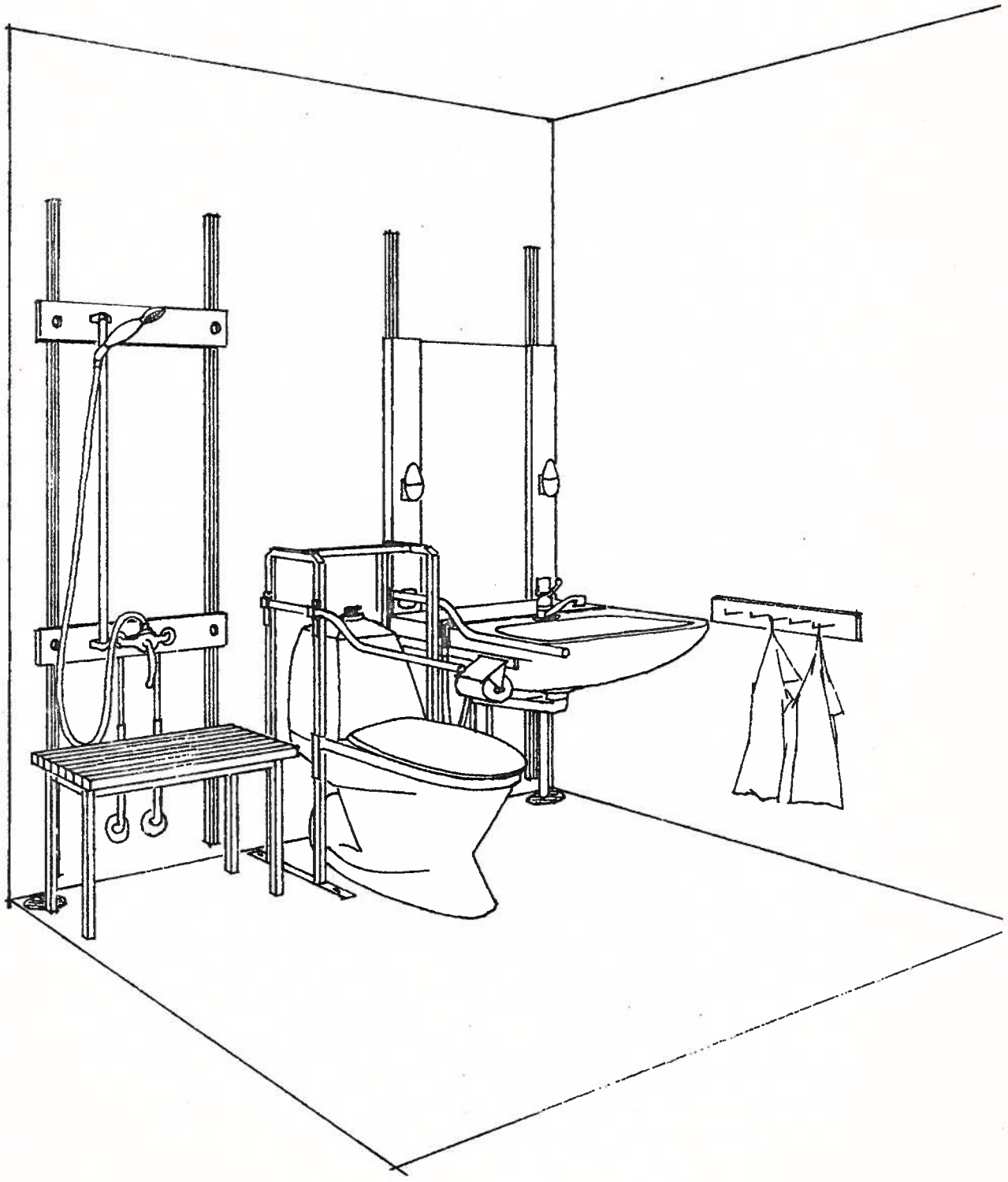
FOKUS FLAT

SINGLE OCCUPANT FLAT

Example of kitchen
Perspective

FOKUS FLAT

HYGIENE ROOM
Perspective view of hygiene room



QUELQUES DONNEES DE L'ERGONOMIE EN SUEDE

DANS L'OPTIQUE

DE L'INSTITUT NATIONAL DE MEDECINE DU TRAVAIL.

Il est précisé dans le titre "dans l'optique de l'Institut National de Médecine du Travail", pour deux raisons :

- employé dans le département de Médecine du Travail de la "Direction Nationale d'Hygiène et de Sécurité du Travail", qui correspond à l'Institut National de Médecine du Travail, depuis le 1er Juillet 1972, l'auteur a des connaissances plus étendues dans cette branche de l'ergonomie,

- la plupart des travaux qui ont été effectués en ergonomie en Suède, ont été exécutés par l'Institut National de Médecine du Travail.

Pour mieux comprendre la situation de l'ergonomie suèdoise, nous apporterons quelques données sur la Suède en général, car bien que la France et la Suède aient des points communs, il existe aussi entre les deux pays des différences marquées.

Quelques réalités sur la Suède.

La suède est un pays à grande superficie dans le cadre européen : 450.000 Km2, c'est-à-dire 80 % de la France. La forêt couvre 50 % des terres. A cause de la configuration longitudinale du pays, il existe de grandes

différences entre les régions du Nord et du Sud.

En Janvier, la température moyenne dans le Sud est de 0° C (3° c à Paris); elle est de - 12° C dans le Nord, et les températures avoisinant - 20° C ne sont pas rares dans ces régions; en hiver, le jour ne luit que pendant 2 heures; au contraire en été, le soleil luit pendant 24 heures ("soleil de minuit").

Pour cette raison, entre autres (coût élevé des transports si les industries sont localisées dans le Nord), la population est concentrée au Sud, dans 4 régions principales :

- région Stockholm
- " Östergötland
- " Gotembourg
- " Malmö.

Dans ces 4 régions, habitent plus de la moitié des Suèdois.

Du point de vue de la population, la Suède est un petit pays d'un peu plus de 8 millions d'âmes. Il en résulte une densité très basse de 18 habitants/Km2 contre 91 habitants/Km2 pour la France, et 353 habitants/km2 pour les Pays-Bas.

Dans le domaine des salaires et des impôts, il y a une grande différence entre la France et la Suède.

Le salaire horaire de la main d'oeuvre ouvrière masculine dans l'industrie est de 14,40 F. en moyenne en Suède contre 4,60 F. en France (données de 1970).

On ne peut donner de chiffres semblables pour les impôts car les systèmes ne sont pas comparables. Pourtant, on peut constater que les impôts en Suède sont en général plus élevés, surtout les impôts directs. Pour un revenu annuel de 30.000 F., l'impôt direct se monte à 35 % de cette somme, et pour un revenu de 100.000 F., l'impôt se monte à plus de 50 %.

L'horaire moyen de travail d'un ouvrier par semaine, dans l'industrie, est égal à 35,4 contre 44,8 en France.

La population active en Suède s'élève à 3,8 millions. Chaque année, on compte à peu près 300 morts par accidents du travail et 120.000 blessés (blessures rapportées).

Bref historique de l'ergonomie en Suède Quelques domaines d'application.

L'Inspection du Travail fut créée à la fin du XVIIIe siècle. La tâche la plus importante fut de prévenir les accidents du travail et de promouvoir un milieu de travail plus salubre. En 1949, en même temps que le psychologiste britannique Murrel inventait le mot "ergonomie", la "Direction Nationale de Sécurité du Travail" apparut comme un établissement public distinct. Toujours la même année, fut adoptée une loi

de protection des travailleurs qui est encore en vigueur; le paragraphe 10 de cette loi établit que : "Work shall be so arranged that it may be carried out in a manner not involving unnecessary fatigue". Cependant, depuis 1970, on prépare une nouvelle loi de protection des travailleurs.

Déjà en 1930, des chercheurs et des instituts universitaires isolés s'intéressaient aux questions relatives à l'hygiène du travail. En 1942, on fit un grand rapport sur la situation de la silicose en Suède. Après cette étude, de nombreuses thèses de doctorat portèrent sur les risques chimiques du travail :

En 1944, l'Institut Psycho-Technique de Stockholm est créé; on commence à étudier les problèmes de la psychologie du travail. Ces dernières années, les questions psychologiques et sociologiques du travail sont à l'honneur dans plusieurs instituts universitaires.

Dans les années 1940, l'intérêt pour la physiologie du travail s'accroît subitement. C'est à cette époque que l'on commence des études de physiologie du travail dans les forêts. Les études de physiologie du travail avaient leur siège principal au Centre National d'Etudes Sportives. Dans ce centre fut créé, à la même époque, une section de physiologie de l'Industrie. En 1955, cette section donna naissance à l'Institut libre de Physiologie du Travail. Dans cet institut, les travaux principaux s'orientèrent vers les industries lourdes : métallurgie, etc ... On fit aussi une classification

générale des exigences physiques de plusieurs sortes de travaux. Le premier poste de professorat de Physiologie du Travail fut créé, dans cet Institut, en 1963.

Comme nous l'avons constaté en introduction, la Suède est recouverte de forêts presque à 50 %; l'industrie du bois revêt donc une grande importance, ainsi que ses dérivés, qui sont l'industrie de la pâte à papier et du papier.
Le bois utilisable est relativement bien dispersé dans le pays, avec cependant une plus grande importance dans le Sud.

L'industrie du bois découvre des problèmes ergonomiques difficiles. Malgré une mécanisation importante, beaucoup de coupes de bois s'effectuent encore manuellement. De plus, la mécanisation introduit de nouvelles données pour l'ergonomie, par exemple, des vibrations plus fréquentes. Les vibrations surtout présentent des problèmes importants que l'on retrouve aussi dans les secteurs de l'agriculture et de la métallurgie, et auxquels on prête une attention croissante depuis plusieurs années.

L'industrie métallurgique en Suède englobe 50 % de l'industrie totale; elle se concentre en 3 points du pays : Stockholm, d'une part, et puis Göteborg et Malmö avec leurs importants chantiers de construction navale.

Dans le Nord de la Suède, ce sont les mines

de fer qui constituent l'activité industrielle prédominante . Le climat qui sévit dans ces régions vient ajouter des problèmes spécifiques. Il faut davantage tenir compte destemps de loisirs et récréation des ouvriers dans un temps diurne et une température supportable réduits à l'extrême. Ce genre d'études contient une grande part de données sociologiques, part importante des études en ergonomie qui commence à se généraliser dans le reste du pays.

"L'INSTITUT NATIONAL DE LA MEDECINE DU TRAVAIL ET LA DIRECTION NATIONALE D'HYGIENE ET DE SECURITE DU TRAVAIL".

Le titre ci-dessus est impropre car l'Institut National de la Médecine du Travail n'existe plus et a été converti en une simple section de la Direction Nationale d'Hygiène et de Sécurité du Travail le 1er Juillet 1972; cependant, comme cette conversion est récente d'une part, et comme elle n'a pas entraîné de profondes transformations d'autre part, sauf dans les postes de direction et dans le domaine administratif, nous allons décrire ci-après la situation avant le mois de Juillet 1972.

La fusion est intervenue pour donner une plus grande efficacité aux deux bureaux, et pour simplifier le transfert des informations entre l'unité de recherche et l'unité exécutive.

L'Institut National de la Médecine du Travail fut créé le 1er Juillet 1966 et a donc exercé ses activités pendant 6 ans, exactement, avant sa transformation.

L'Institut fut fondé dans le but de rassembler plusieurs activités dans le domaine de Médecine et d'Hygiène du Travail, et de permettre la coordination de recherches effectuées par des experts dans des sciences diverses : psychologie, sociologie, chimie, ...

Le coeur de cet Institut fut institué par la section de Physiologie du Travail du Centre National Sportif, mentionné ci-dessus, auquel fut ajoutée la section d'Hygiène du Travail de l'Institut National de la Santé Publique. En plus, furent détachés auprès de l'Institut des médecins-chefs de l'Hôpital Karolinska. L'Institut était sous le patronage du Ministère des Affaires Sociales.

L'Institut est divisé en 5 départements : Médecine, Chimie, Technique, Physiologie du Travail, Psychologie du Travail. Chaque département est ensuite divisé en plusieurs sections.

L'Institut a quatre objectifs principaux : recherche, service, enseignement et formation. La répartition des activités est difficile à réaliser à cause de leurs interférences réciproques. On peut estimer la recherche entre 50 % et 60 % de l'activité de l'Institut, les services à environ 10 %, et l'enseignement à 30 %.

Les recherches sont parfois menées au niveau de chaque section en division, et parfois à un niveau plus général qui fait participer plusieurs divisions à une même étude (pour le moment, par exemple, une étude est en cours sur l'influence des inhalations de dissolvants, étude à laquelle toutes les divisions participent). La recherche dans l'unité de physiologie est portée d'une part, sur des études fondamentales sur la puissance de travail et des mécanismes physiologiques et d'autre part, sur une planification de différents postes de travail et la création de postes acceptables d'un point de vue ergonomique.

Le service établit le coût de revient des études effectuées pour l'industrie, ce coût étant supporté par celle-ci. Ces études sont souvent dues à l'initiative du service sanitaire de l'entreprise ou de l'ingénieur chargé de la sécurité; et le plus souvent, on essaie de faire participer aux études des représentants syndicaux. Grâce à ces études sur place, on peut établir des rapports dans lesquels figurent le bilan de la situation actuelle mais aussi des propositions pour améliorer cette situation.

L'enseignement prépare à 4 diplômes différents : médecin d'entreprise, infirmière d'entreprise, ergonomiste et ingénieur de sécurité. Ces cours durent de 5 à 22 semaines qui s'échelonnent sur l'ensemble de l'année. Les candidats doivent exécuter une recherche personnelle ou en groupe. Les cours sont dispensés par le personnel propre de l'Institut, mais aussi par des professeurs des écoles supérieures.

La diffusion d'études la plus importante est assurée au niveau international, par la publication en anglais de "Studia Laboris et Salutis".

La Direction Nationale d'Hygiène et de Sécurité du Travail emploie environ 150 personnes; il existe aussi environ 300 inspecteurs du Travail. Ce personnel est très insuffisant pour surveiller la sécurité dans l'ensemble des industries. A la tête de la Direction Nationale, le responsable a le grade de Directeur Général. La fonction principale de cette Direction est : améliorer la sécurité et la généraliser, instruire sur les différentes possibilités d'horaires de travail, édicter des règles de sécurité, donner des cours dans le domaine de sécurité du travail, et enfin contrôler l'observation des lois.

Le budget pour l'année 71-72 était de 10 millions couronnes pour la Direction et 17 millions pour l'Inspection du Travail.

Autres organismes d'ergonomie

Dans plusieurs Centres Hospitaliers Universitaires, on fait des études ergonomiques dans des sciences variées ; par exemple: anatomie et neurologie à Karolinska.

Les branches de sociologie et de psychologie de l'ergonomie sont étudiées dans les universités correspondantes et dans des Instituts Psychotechniques.

Le département de la Défense effectue aussi des recherches en rapport avec l'ergonomie.

L'Association des Coopératives de consommateurs (KF) a son propre laboratoire d'ergonomie; on y étudie les questions en rapport avec le consommateur : par exemple, l'ergonomie dans la maison; aussi bien dans les industries classiques.

A stockholm, il existe un groupe d'ergonomistes qui est subventionné en grande partie, par la Direction Nationale pour le Développement Technique, et qui fait surtout des analyses des différentes branches d'industrie en ce qui regarde le milieu du travail (par exemple, l'industrie du bois).

De nature bénévole, la Société d'ergonomie

Nordique organise des conférences, et des séminaires. Le but de la Société, d'après ses statuts est : "to dissimate more profound knowledge of the interaction between man and the environment in which he lives and works, and also to foster applications of such knowledge to the design of that environment, with consideration given to human needs and capabilities, safety and health".

La Société comptait, en Octobre 1972, 320 membres dont 230 Suèdois. Des études sont en cours pour la création d'une revue.

La fondation pour la Protection des Travailleurs créée en 1972, doit distribuer 20 millions de francs cette année, pour "promouvoir la santé et la sécurité dans les conditions de travail".

L'Education en ergonomie en Suède

Comme nous l'avons dit auparavant, l'Institut de Médecine du Travail propose, depuis 1968, des cours en ergonomie. Ces cours comportent 5 semaines de cours théoriques, et de travaux pratiques. Ils sont destinés aux personnes qui veulent créer de nouveaux postes de travail en tenant compte de connaissances ergonomiques.

Un enseignement de niveau universitaire n'existait pas. Pourtant quelques cours isolés furent donnés dans de grandes écoles comme par exemple un cours d'Hygiène de l'Industrie et de l'Environnement à l'Ecole Polytechnique.

En 1973, on va créer un enseignement des Sciences du Travail à l'Ecole Supérieure Technique Luleå; la durée des études sera de 4 ans.

Comme enseignement en ergonomie organisé dans plusieurs institutions et d'un niveau élevé, on doit mentionner le cours de 2 ans de l'Association des Coopératives de consommateurs. Cependant, ce cours n'a pu être dispensé qu'une fois, car les frais qu'il représentait étaient trop élevés pour l'Association.

On étudie aussi l'ergonomie dans le primaire en biologie; dans le secondaire, l'ergonomie existe comme une matière indépendante, dans certains lycées techniques et dans les centres d'études techniques.

Enfin, des entreprises privées, par exemple Volvo, organisent des cours pour leur personnel, et la confédération Générale du Travail pour les responsables de la sécurité.

References

1 - Feuillet de documentation sur la Suède, l'Institut Suèdois.

2 - Réalités sur la Suède, 1971,72, Stockholms Enskilda Bank, Stockholm.

3 - Voici la Suède, l'Institut Suèdois, 1971.

4 - The National Institute of Occupational Health in Sweden, S. Forssman, Arbetsmedic inska Institutet Ö 106/71, Stockholm.

5 - The Swedish Work Environment Fund, a brief information, Arbetarskyddsfonden, Stockholm.

6 - The Laboratory of Environmental Hygiene and Ergonomics, KF Information, Stockholm.

7 - The human work environment, Swedish experiences, trends and future problems, Royal Ministry for Foreign Affairs, Stockholm.

8 - Ergonomin i Sverige. JE Hansson, KAS, Stockholm.

9 - Occupational Safety and Health in Sweden, KAS, Stockholm.

10 - Arbetarskyddsverket, Arbetarsskyddsstyrelsen och yrkesinspektionen, uppgifter organisation mm, KAS,Stockholm.

11 - Arbetsmedicinska institutet sex års verksamhet, S Forssman, Stockholm.

12 - Arbets vetenskap i Luleå, Betänkande III avigivet av Org. komm. för Högre Teknisk utbildning och forskning i övre Norrland, Luleå 1972.

L'EVOLUTION DE L'INSTITUT NATIONAL

DE MEDECINE DU TRAVAIL

	1966	1967	1968	1969	1970	1971
Nombre d'employés	90	97	110	113	119	140
Revenus (mille couronnes)	61	198	316	205	530	750
Subventions (million couronnes)	3,6	4,1	5,1	6,8	7,8	10,3

Nombre de membres de

NORDIC ERGONOMIC SOCIETY

	1971	1972
Suède	172	230
Denmark	44	
Norvege	25	
Finland	16	
somme :	257	320

MINISTERES DES AFFAIRES SOCIALES

DIRECTION NATIONALE D'HYGIENE ET DE SECURITE DU TRAVAIL		
Département surveillance	Départ.Médecine du Travail	Départ. Administration
Section technique générale " de " des machines Section de Médecine " des forêts " sociale " du trafic	Unité de physiol.du Travail " " psychologie " " chimique " médecine " technique	Section d'horaires " d'administration interne " d'enseignements et information

J. Appl. Physiol., 18:367–370 (1963b).
Margaria, R., P. Cerretelli, P. E. di Prampero, C. Massari, and G. Torelli: Kinetics and mechanism of oxygen debt contraction in man. *J. Appl. Physiol.*, **18**:371–377 (1963c).
Margaria, R., P. Cerretelli, and F. Mangili: Balance and kinetics of anaerobic energy release during strenuous exercise in man. *J. Appl. Physiol.*, **19**:623–628 (1964).
Margaria, R., P. Aghemo, and G. Sassi: Lactic acid production in supramaximal exercise. *Pflügers Arch.*, **326**:152–161 (1971).
Passmore, R., and J. V. G. A. Durnin: Human energy expenditure. *Physiol. Rev.*, **35**:801–840 (1955).
Piiper, J., P. E. di Prampero, and P. Cerretelli: Oxygen debt and high energy phosphates in gastrocnemius muscle of the dog. *Amer. J. Physiol.*, **215**:523–531 (1968).
Shepard, R. J., S. M. Benade, C. T. M. Davies, P. E. di Prampero, R. Hedman, J. E. Merriman, K. Myhre, and R. Simmons: *Bull. World Health. Org.*, **38**:757–764 (1968).
Steplock, D. A., A. Veicsteinas, and M. Mariani: Maximal aerobic and anaerobic power and stroke volume of the heart in a subalpine population. *Int. Z. angew. Physiol.* (1971).
Veicsteinas, A., M. Fumagalli, E. Camoni, and P. Cerretelli: La gettata cardiaca nella contrazione muscolare isometrica nell'uomo (in preparation) 1971.

Psychological Aspects of Physical Activities

In: Larson, L. A. (Ed.)
Fitness, Health, and
Work Capacity
International Standards
for the Assessment.
N.Y.: MacMillan Publ. Co. Inc.
1974.

7

Gunnar Borg
University of Stockholm
Stockholm, Sweden

Research in physical activity includes many psychological problems that are of interest to the fields of sport and physical education, ergonomics and human factors engineering, and medicine and rehabilitation. There are many reasons why the psychological aspects of various physical activities should be studied. One theoretical reason is that, according to general scientific classifications, performance problems in physical activity belong to the same "descriptive level" and "explanatory level," in a macro-micro-continuum from sociology to biophysics, as do most other psychological problems. Since psychology is a behavioral science and deals with studies of human performance, there will be an overlap with work physiology. The psychology of physical activities is then one branch within the broad field concerning the scientific study of human physical activities, a scientific field for which I have tentatively proposed the name "ergology."

Another reason that psychological problems are of interest in this field is that physical activities may be looked upon as configurations or "gestalts" depending on a complex interaction of many factors. Not only physiological, morphological, and biochemical factors are involved but also psychological ones such as perceptual and information processes, decision making, memory storage and other cognitive factors, psychomotor coordination, learned movement patterns and technique, various motivational factors to participate and perform, emotional factors, and personality traits. Some of the important aspects are the relationships between physical stress and physiological and mental functions, the variations in psychological performances with physical arousal and fatigue, and the importance of physical fitness for a healthy life.

A physically stressing situation to which a subject tries to adapt himself may be studied with regard to perceptual, performance, and physiological responses. These three different kinds of stress indicators, or effort continua,

complement one another. When studying sport achievements or performances in daily work (for example, after improvements made in industrial work tasks according to human factors criteria), it is important to know the "costs" at which the individual is working. Besides a study of the technical aspects and the physiological responses of the man at work, the psychological "costs" in the form of perceived exertion, subjective stress, and fatigue should be studied to enable us to understand the individual better.

We should try to identify different intensity levels in a perceptual continuum and see how they are related to one another and to the corresponding levels in the performance and physiological continua. In psychophysical studies most interest has been focused on minimum and maximal thresholds, on differential thresholds, and on the type of functions describing the variation between these limits. However, in everyday life there are other intensity levels of interest, such as various adaptation levels, preference levels, forced adaptation levels, and stress zones. When we try to adapt ourselves to a work situation, the load must not be so high that we come too near the stress zone in relation to our present maximal working capacity. To identify which industrial task is too strenuous for the individual, the perceived "difficulty" of the work can be obtained and used as a stress indicator. Measurements of apparent force and perceived difficulty can also be used for a quantitative evaluation of the degree of physical stress and can thus complement the physiological measures.

General Studies of Subjective Force and Perceived Exertion

Toward the close of the 1950s in Umeå, Sweden, we started to study subjective force and perceived exertion during physical work by means of modern psychophysical methods. One factor that led us to start this empirical research was a clinical observation that the decrease in physical working capacity experienced by an individual did not seem to correspond to the decrease determined by physical work tests. When a lumber worker came to the hospital complaining that his working capacity had gone down at least 50%, the laboratory tests revealed a decrease of only 20 or 30%. This discrepancy could not be interpreted as simulation, but seemed to be a general perceptive problem connected to a nonlinear relationship between perceived exertion and physical performance. Since a decrease of physical working capacity as perceived by the subject is one of the most important reasons to see a doctor, we wanted to study this problem further.

Psychophysical methods have been developed, especially by S. S. Stevens (1957, 1966), for a quantitative evaluation of the intensities of perceptions. These methods allow for determinations on a "ratio level," that is, the scales may roughly be considered as equidistant scales with a zero point; this

permits descriptions of the relation between subjective and objective intensities in terms of mathematical functions. Many sense modalities have been studied, and a power function seems to be the most general expression for describing how subjective intensity varies with physical stimulus intensity.

Experiments have been performed to study how subjective force during short-time work (less than one minute) on a bicycle ergometer varies with the pedal resistance. In several experiments that used ratio production methods such as halving and doubling, where the subject had to set a variable intensity so it was perceived to be half as intense or twice as intense as a certain standard stimulus, power functions with an exponent of about 1.6 seemed to give good descriptions of the variation of subjective force with physical workload. The same results have been obtained with estimation methods where randomly presented workloads had to be judged by the subjects in terms of percentage of a certain standard workload or in relation to their notion of a maximal load (Borg and Dahlström, 1959, 1960; Borg, 1962, 1972).

In studies of subjective handgrip force, positively accelerated functions with an exponent of about 1.7 have been found (Stevens and Mach, 1959). An exponent of 1.6 also was found for apparent foot pressure in a study by Eisler (1962). A new type of method was applied in a study by Borg, Edström, and Marklund (1970) where the stimulus intensity was varied as a function of time, and the subject's task was to report how he perceived the variation. When the workload on the bicycle ergometer was changed as the 0.5 power of time, the variation was judged to be about linear. The exponent of the corresponding psychophysical function is 2.0. For hard work of longer duration (more than 1 min), the stress on the circulatory and respiratory systems is an important factor determining perceived exertion. The expression of the psychophysical functions might therefore be somewhat different for work of longer duration than for work of short duration. However, in several studies Borg (1962) found positively accelerated functions with an exponent around 1.6 for the increase of perceived exertion with workload in an ordinary test of physical working capacity, where the workload is increased in a stepwise fashion, as in the tests utilized by Sjöstrand (1947) and Wahlund (1948). Hueting and Sarphati (1966) also obtained positively accelerating functions in their studies of "fatigue" (in this case "fatigue" has about the same connotation as "exertion") during an ordinary work test. For practical purposes, however, they applied linear regression curves to their data.

The nonlinearity between subjective and objective intensities should be kept in mind. If we want to adapt work intensity to a subject and avoid this acceleration so that we can obtain subjectively equal increases of load, the objective work intensity ought to increase by smaller and smaller steps. The results are also of interest when considering how man experiences changes in his physical working capacity. Because of the shape of the psychophysical function, a decrease in an individual's objective maximal working capacity

by a certain percentage causes a greater perceived decrease than that decrease perceived when exertion has involved a certain submaximal workload.

Borg and Edgren (1972) studied the subjective adaptation to heavy physical work on a bicycle ergometer in two groups of subjects, one male group ($n = 7$) and one female group ($n = 7$). In the beginning each subject had to set the workload corresponding to his perception of half (50%) of his maximal exertion. Then, during the first 15 sec of the trial, the subject adjusted the workload so that it corresponded to his perception of half his maximal exertion, as it was perceived at the outset. Once each minute the subject adjusted the workload to the same subjective intensity. The idea was that the subject should produce a workload of just the right intensity to keep the perceived intensity the same throughout the time period. In Figure 7-1 the results are shown for both the male and the female groups. There was some uncertainty in the starting data so that, because the number of subjects is fairly small, the results have to be interpreted with caution. However, it is quite obvious that the subjective adaptation gives rise to the strongest change right at the beginning of the work and that the best function for describing the workload change over time, keeping the subjective intensity constant, is an exponential function.

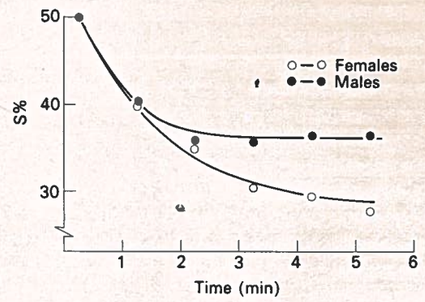


Figure 7-1. Adaptation curves for one group of males ($n = 7$) and one group of females ($n = 7$). S is the produced physical intensity corresponding to an equal subjective intensity. The figure shows relative values in percentage of a maximal value (see text) with the curves anchored at the first trial.

In another series of experiments the subjects had to estimate the change in the subjective intensity over time when the workload was kept constant. The adaptation curves obtained in this manner closely resembled those from the production experiments; they increased according to positively accelerated functions but were the inverse of the curves shown in Figure 7-1 (Borg and Edgren, 1972).

Differential Studies of Perceived Exertion

For practical and differential purposes, the "ratio-scaling methods" described above are not very applicable. Simple rating methods of a category type have therefore been developed to obtain values of perceived exertion. The first scale that was widely used consisted of 21 points, where the *odd values* were anchored with verbal expressions such as "very light" and "rather laborious" (Borg, 1962). This scale has been used to study perceived exertion during an ordinary work test with a stepwise increase in the workload involving various groups of normal people and patients. A very high correlation, $r = 0.85$, was found between ratings on this scale and heart rates (Borg, 1962).

The scale that has been most frequently used during recent years is the Ratings of Perceived Exertion (RPE) scale which works in the same manner as the 21-point scale. The RPE scale consists of 15 grades from 6 to 20 and is constructed to obtain a very close correlation with heart rate. For healthy middle-aged men the heart rate at moderate to high intensities may be roughly predicted from the RPE values simply by multiplying by 10. Before a subject is tested, he is given simple instructions to rate the degree of exertion as accurately as possible according to the scale, which is presented to him in a quarto format. The subject answers by saying a number and by pointing with his finger at the perceived scale value.

The ratings of perceived exertion increase in a fairly linear manner with the workload and, thus, also with the heart rate. High correlations are always found in normal groups of subjects, when "normal" variation of physical stress is used from light to hard work. Most of the correlations are between 0.80 and 0.90 (Borg et al., 1968; Skinner et al., 1969; and Borg, 1971b). In groups of patients the correlation goes down and varies from 0.50 to 0.70, depending on the heterogeneity of the group with respect to the various factors affecting the degree of exertion.

There are marked differences in physical working capacity among people of different ages, body composition, and so on. For various kinds of submaximal work similar differences are found in physiological responses to physical stress, so that young and fit people react with less physical stress than old and less fit people. The same result is also obtained in psychological responses, such as perceived exertion. Thus, women react with a stronger response of perceived exertion than men for the same physical work. However, when relative values are used, so that the intensity of the response is set in relation to the capacity of the individual, no sex differences are found.

In a study by Borg and Linderholm (1967), both male and female subjects of various ages had to go through a physical work test with a stepwise increase in the workload each 6 min according to methods used by Sjöstrand (1947) and Wahlund (1948). Ratings of perceived exertion according to the

21-point scale were obtained at the same time as heart rates. The female groups rated the exertion to be higher in relation to workload than did the male groups, but there were no significant differences between the sexes.

In the same study Borg and Linderholm (1967) found fairly great differences between age groups with respect to the relation between perceived exertion and heart rate. For workloads of different intensities the heart rate did not change with age. The ratings of perceived exertion, however, increased for the same workloads fairly linearly with age. Since we know that physical working capacity decreases with age, the ratings give a better and more direct indication of the "real" change in physical stress with age than do heart rates. The maximal heart rate decreases with age in a fairly linear fashion (Robinson, 1938; I. Astrand, 1960; Strandell, 1964; and Borg and Linderholm, 1967). For subjective work intensities, according to the ratings, the heart rate decreases with age as the maximal heart rate decreases. This result validates the use of ratings and the use of relative heart rates. As indicators of physical stress, the ratings do not have to be corrected for age, but the heart rates do. The "same" degree of stress is thus indicated by the same rating value; however, by decreasing heart rates with age according to special equations for the various relative intensities (for example, for 66% of the range above the resting value), the age-independent interindividual reference level in heart rate, that is, the relative heart rate (RHR) can be obtained.

$$\mathrm{RHR}_{0.66} = 150 - 0.5(A - 20)$$

where 150 for the 20 year olds is set as a reference level and A is the age in years (Borg and Linderholm, 1967; Borg, 1970b).

As we have seen, a difference exists between various age groups in the relationship between heart rate and perceived exertion. There also exists a difference due to body composition and activity level. In a study of work on a bicycle ergometer Skinner et al. (1969) showed that, at the same submaximal workloads, active subjects had lower heart rates and lower ratings than did sedentary subjects. In addition, heavier subjects had a lower heart rate than lean subjects, but there was no difference in ratings. When work was compared on an absolute basis, there were differences which seem to be related to the level of fitness and body composition. When related to working capacity, however, these factors were not of measurable importance.

The effect of training on perceived exertion in physical work has been studied using a group of Swedish soldiers (Linderholm, 1967). After a period of conditioning, the subjects' ratings of exertion for a given workload were lower than before the conditioning program. The same result was found in studies by Docktor and Sharkey (1971), Ekblom and Goldbarg (1971), and Borg et al. (to be published). Data from Borg et al. are shown in Figure 7-2. Under the same workloads both heart rates and ratings go down in about the

same manner so that the relation between heart rates and ratings is unaffected. In the study by Ekblom and Goldbarg (1971), the ratings were lower after training for a given level of oxygen uptake but were the same when related to the "relative" (per cent of maximum) oxygen uptake.

In a bicycle ergometer study involving a representative sample of men born in 1913 in Göteborg, Sweden (Grimby et al., 1972), perceived exertion was measured using the method proposed by Borg (1970b) together with several physiological variables. The authors found that the ratings of physical stress gave some additional information and that the error of measurement was comparatively small, or, as they state: "It is worth noticing that the standard deviations for perceived exertion are of similar magnitude as those for the heart rates."

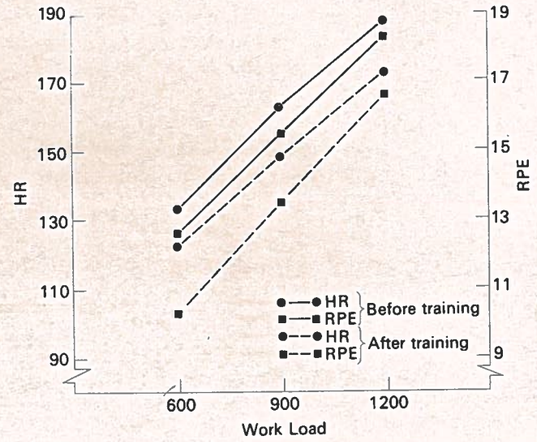


Figure 7-2. Heart rates (HR) and ratings of perceived exertion (RPE) at three different workloads before and after a period of physical training.

A few studies have also been performed investigating different types of work. Experiments by Noble and Borg (reported by Borg, 1970b, and Noble et al., to be published) have shown that jogging is perceived to be easier than walking at the same moderate-to-high speed and that heart rate is higher for jogging than for walking at the same subjective intensities (ratings). Ekblom and Goldbarg (1971) found that the ratings of perceived exertion for given levels of oxygen uptake were higher during arm work than during leg work, as well as during cycling when compared with running or swimming. In a study they did on autonomic nervous system blocking agents, the positive correlation between heart rate and ratings was altered.

Some Clinical Studies

In some Swedish hospitals the discussed method of obtaining category ratings of perceived exertion during a work test (see pages 145–147) is now used routinely. Results from thousands of patients have been obtained and analyzed with regard to the medical syndromes in question. Three main groups of patients have hitherto been analyzed (Borg and Linderholm, 1970): patients with coronary heart disease, patients with arterial hypertension, and patients with the vasoregulatory asthenia syndrome. In comparison with a healthy control group of the same age, the group with vasoregulatory asthenia had a higher heart rate (HR) at particular rating values (R) (that is, they rated the exertion to be less in relation to the heart rate), especially at low intensity levels. This result is shown by the two upper lines in Figure 7-3. Results of a similar nature were also found in the group with arterial hypertension. However, the patients with coronary heart disease rated the exertion to be higher in relation to heart rate, especially at high intensity levels, than a healthy control group of the same age. (See the two lower lines in Figure 7-3.) For all the patient groups studied there was a smaller increase in heart rate in relation to a given increase in the rating of perceived exertion. The differences found between the groups of patients and the control groups are of differential diagnostic interest.

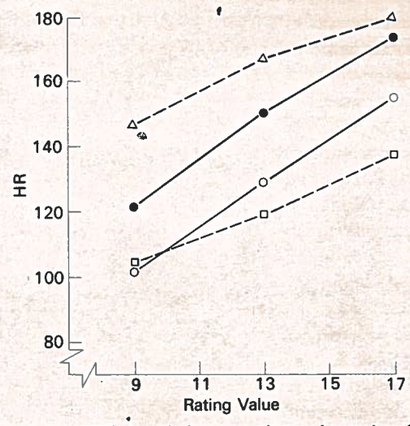


Figure 7-3. Heart rates (HR) in relation to ratings of exertion for two groups of patients and two healthy control groups of the same age as the patients. *Upper dashed line:* patients with the vasoregulatory asthenia syndrome; *upper full line:* the corresponding control group (age about 30 years). *Lower dashed line:* patients with coronary insufficiency; *lower full line:* the corresponding control group (age about 60 years).

In a study of physical working capacity and of the relation between heart rate and perceived exertion (Borg et al., 1969), clients at a rehabilitation center in the United States went through a test on a bicycle ergometer involving a stepwise increase in the workload. The group had about 40% lower physical working capacity, according to the workload at a pulse rate of 150 beats/min, than did two different groups of students used as reference groups. The clients also rated the exertion to be higher for the same workloads than the normal reference groups. It seems probable that the main reason for the result is the effect of institutionalization and bad conditioning programs.

The influence of hypnotic suggestions on perceptual and physiological responses to a bicycle ergometer task was studied by Morgan et al. (1971). In this study the subjects had to work under a certain constant workload and were told that they were going to exercise under light, moderate, and heavy workloads. The results of the study showed that hypnotic suggestion evoked perceptual and physiological changes that led the authors to conclude that "complex somatopsychic phenomena govern perceptual and physiological responsivity to muscular exertion."

A Bicycle Ergometer for Physiological and Psychological Studies

None of the existing bicycle ergometers satisfies all the demands of general usefulness required in physiological and psychological studies. It is, for example, very difficult now to determine muscular strength for short-time work, to perform intermittent work with short pauses and fast changes of the stimulus conditions, or to work steadily while continuously varying the load. When we want to determine terminal thresholds for dynamic muscular strength, the power variation should be large enough to avoid ceiling effects. It should also be possible to increase the workload linearly—or according to some other suitable function—with the pedalling time and to regulate it by means of a reliable automatic device.

The ergometer should also be very flexible in the variation of required power increase or decrease per unit of time in order to make it possible to adapt the experimental conditions to the great differences that exist among individuals with respect to muscular strength, endurance capacity, perceived exertion, and work motivation. This flexibility of the ergometer is especially desirable if the working conditions are to be manipulated during the experiment so as to bring about subjective conformity in the working conditions. It is also important that these requirements be met in psychophysical experiments, where changes of subjective force and perceived exertion are studied with ratio-scaling methods.

The new bicycle ergometer (Borg, Edström and Marklund (1971)), which is a modification of the one designed by Holmgren and Mattsson (1954), fulfills the above mentioned requirements. Of the ergometer's two main

components, the pedalling unit is identical with the latest version described by Holmgren and Mattsson, except for the flywheel, which has a rotating mass of 40 kg × m² by means of which "dead phases" during pedalling are eliminated. The regulator unit is constructed to regulate the generator load up to 7000 kilopound meters per minute (kpm/min) (about 1.150 watt) with transistors as the basic components of the unit. The potentiometer, which controls the power level, is constructed to give a continual change of power with the pedalling time, either linearly or according to a power function with one of the following exponents: 0.40, 0.50, 0.66. The speed of the precision motor, attached to the axle of the potentiometer, is adjustable permitting different rates of power increase (or decrease) from 0 to 500 kpm/min per sec. The regulator unit also consists of a potentiometer, which controls a mechanism for fast resetting of the power level, and automatic starting and cut-out devices.

This ergometer is particularly useful for performance tests of physical working capacity, for example, the cycling strength test (CST) (Borg, 1962) and the cycling strength and endurance test (CSET) (Borg, 1968), and also for psychophysical determinations of subjective force and perceived exertion (Borg, Edström and Marklund, 1970).

Two Individually Adapted Performance Tests

Some of the commonly used work tests on the bicycle ergometer in Sweden are those designed by P.-O. Astrand (1952), I. Astrand (1960), and Astrand and Ryhming (1954), by Sjöstrand (1947) and Wahlund (1948), and by Tornvall (1963). The first two tests utilize heart rate during submaximal work as a direct indicator of physical stress and as an indirect estimate of working capacity. The third type of test is of maximal character and gives information about performance capacity.

The CSET (Borg, 1962; 1968) is a pure performance test and takes into consideration the advantage of an interindividually constant testing time. The test consists of a series of intermittently determined thresholds, usually 10, with one determination per minute. At each determination the workload is continuously increased from an initially rather low level to a level where the individual is unable to pedal any further. The initial level of a forthcoming determination is directed by the final level of the preceding one, thus a feedback system is built into the test to keep the testing time fairly constant for each individual. The strength thresholds form a work curve which is analyzed with respect to level, regression, and residual variation, the curve gives information about the individual's dynamic muscular strength, endurance capacity, and motivation for physical work.

The reliability and validity of the CSET are high. In several studies significant correlations have been obtained with various field criteria, such as

wages in lumber work ($r = 0.62$), ratings of military fitness of infantry men ($r = 0.55$), and results from athletic competitions (Borg 1962; Borg and Stockfelt, 1966). In Figure 7-4 two CSET curves are shown for a group of male soldiers, one before a conditioning program and one after about 1 month of training.

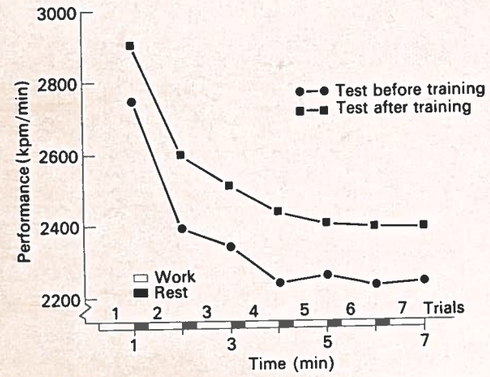


Figure 7-4. Two CSET curves (see text) consisting of thresholds for maximal performances on bicycle ergometer, one curve before training and one curve after training.

The principles for a test, called the individually adapted work test (IAT), which utilizes stepwise-increased workload changes in accordance with the subject's heart rate as well as his ratings of perceived exertion, have recently been developed by Borg (1966) and Borg, Edgren, and Marklund (1970a). The test gives a behavioral measurement of physical working capacity in the form of the highest workload under which a subject is able to work for 4 min. The subjects have to work for the same duration on a series of subjectively equal workloads instead of on physically equal loads.

To be able to keep the testing time fairly short (about 10 min), the test is divided into two main parts. The first part consists of a work period of 6 min and is subdivided into three phases of 2 min each. Heart rate and ratings of perceived exertion are registered at the end of each phase and are used to determine the workload for the next phase. The workload is successively increased from phase to phase so that, after the first 6 min, the subject should have reached the highest workload at which he is able to continue for another 4 min. The magnitude of the workload adjustment at the end of each steering phase depends on how near the individual's heart rate and rating of perceived exertion are to the expected values for the actual sample of subjects. The initial level is determined by anamnestical, morphological, and other available laboratory data. Preliminary studies have produced good results

with respect to the relation between the observed time and the expected testing time of 10 min, and high correlations have been found with other work tests of maximal character as well as with external criteria of physical performance capacity.

A Study of the Transition from Short-Time Work to Prolonged Work

To study the transition from short-time (mainly anaerobic) to prolonged (mainly aerobic) work, determinations of terminal thresholds were made using the bicycle ergometer (Borg et al., 1972). Thirty male students took part in the experiment, which was arranged so that the subjects had to work as long as they could during short work periods. The workload was increased continuously until they could not pedal any more. The rate of the workload increase was varied from 10 to 100 kpm/min per sec. The results, presented in Figure 7-5, show how the strength thresholds vary with the time used per trial (for each rate of workload increase). The dashed line is based on a rough correction of the thresholds due to the slight additive influence of the flywheel (40.1 kg × m²).

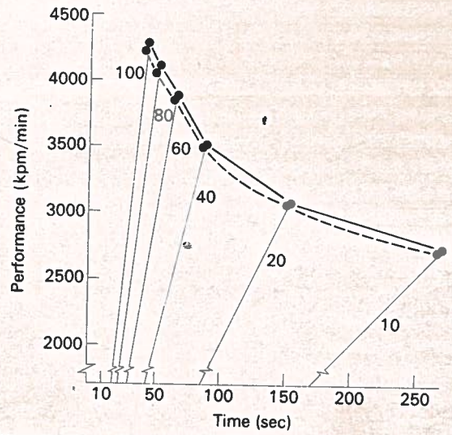


Figure 7-5. Changes in terminal thresholds on the bicycle ergometer showing the transition from short-time work (mainly anaerobic) to prolonged work (mainly aerobic). The rate of the workload increase was varied from 10 to 100 kpm/min · sec.

As can be seen from Figure 7-5, the curve falls linearly with time in the beginning; however, it changes direction after 1 min and levels off more and more, indicating a physiological transition from anaerobic to aerobic work. This result was also supported by changes in the correlations between the

thresholds and external measurements of endurance capacity (such as results from a skiing competition and a cross-country race) and muscular strength (such as force of handgrip and shoulder thrust). The bicycle ergometer has now been improved to permit studies of threshold changes in a range from 1 to 500 kpm/min per sec. One tenable hypothesis is that an S shaped function will be found in which the inflection point may be connected to the transition from anaerobic to aerobic work.

Work Motivation

An important concept in the field of motivation is the concept of "drive," which is included in many theoretical systems (for example, Woodworth, 1918; Hull, 1943, 1951; Miller and Dollard, 1941; and Brown, 1961). Closely connected to the concept of drive is that of "arousal." The activation theorists, such as Duffy (1934, 1962), stress that behavioral arousal can be observed by means of a variety of measurements and that arousal varies in a continuum from sleep to a very excited state. Another theoretical proposition concerning arousal states that performance increases from a low point, when arousal is low, to a high point, at an intermediate level of arousal, and then declines as arousal increases still further, that is, in accordance with an inverted U-shaped relation where the optimum is dependent upon the complexity of the task (Yerkes and Dodson, 1908).

The theory of achievement motivation developed by Atkinson and Feather (1966) asserts that the strength of motivation to achieve, as expressed in performance level, is a multiplicative function of the motive strength, the subjective probability of goal attainment (expectancy), and the incentive value of success. The incentive is assumed to be an inverse linear function of expectancy. The relationship between "motivation" and "expectancy" follows an inverted U-shaped curve with an optimum level of motivation occurring when expectancy = 0.50 (Atkinson, 1958). The assumed positive relationship between the motive to achieve and the level of performance is shown to be reduced when another motive (for example, monetary need) is involved. When motivation to achieve and to avoid failure are simultaneously aroused, their algebraic sum constitutes the resultant motivation.

A model for the quantitative analysis of work motivation was suggested by Borg (1962, 1964a), and by Borg, Edström, and Marklund (1967a). In this model, "work motivation" is a construct indicating the extent to which the individual utilizes his endowments (for example, motor and circulatory organs) for maximum performance.

A physical performance is expected to depend on work motivation, technique, and physical endowments, which can be estimated from morphological and physiological measurements (Borg, Edström, and Marklund, 1967a). For simple physical performance (for example, work on a bicycle

ergometer), the difference between an observed performance and a performance predicted on the basis of physical endowments constitutes a residual which makes estimation of work motivation possible, since the technique used can be assumed to influence only a small portion of the total performance variance. In Figure 7-6 the principles for calculating work motivation are shown. A and B are two individuals, one with a high and the other with a low work motivation.

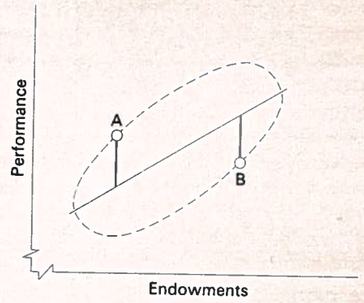


Figure 7-6. The figure shows how motivation-loaded performances may be predicted from nonmotivation-loaded endowments. According to this model of work motivation, quantitative measurements of motivation are obtained; for example, *A* represents a subject with a high work motivation and *B* a subject with a low motivation.

Some investigations have been performed on work motivation using three different kinds of motivation indicators: (1) perceptive, such as perceived exertion, (2) performance, such as motivation-loaded maximal performances, and (3) physiological, such as heart rate and lactate acid concentration. In experiments by Borg and Edström (1964, 1967) CSET performances were studied in connection with "high" and "low" motivation induced through instructions. During low motivation the subjects were instructed to work about half their maximal capacity. Significant differences in performance during "high" and "low" motivation were obtained in level, slope, and residual deviation of the CSET curve. A tendency toward a larger relative deviation and a smaller total slope was found during "low" motivation than during "high." A positive correlation ($r = 0.57$) was found between the motivation-loaded personality trait validity (implying good energy resources) according to the Marke-Nyman Temperament scale (Nyman and Marke, 1962) and the slope of the CSET.

Different types of actual physical performances (for example, maximal work during a specified time and CSET measurements) were subtracted from those predicted on the basis of different indicators of physical endowments

(for example, workload at a heart rate of 170 and morphological measurements indicating muscularity). The differences were used as quantitative measurements of motivation for physical performance in a study by Borg, Edström, and Marklund (1967a). The obtained motivation measurements showed high correlations with one another although they were derived by quite different methods. Two sets of measurements of motivation with high intercorrelations were discerned: one set included relations between measurements concerning anaerobic work and another concerning aerobic work.

In experiments on monetary reward (Borg et al., 1971) the results showed that motivation-loaded maximal performances, derived using the CSET method, increased with increased reward and that this effect was positively related to monetary need, as measured with a behavioral indicator. The change of performance with changes in the amount of monetary reward followed a negatively accelerating course. The same course was obtained for changes in performance with the same number of trials when a constant reward was given.

Some Particular Aspects with Regard to Training

In exercise prescriptions it is sometimes hard to determine the intensity of the exercise that is most suitable for a certain individual. One good indicator of the intensity of the exercise is, of course, the heart rate. However, some people have difficulty in counting the heart rate or, if they can, soon become "pulse-counters" who cannot do anything without counting pulse rates. Thus they focus their interest too much on this activity and become somewhat too preoccupied with it. A complement of pulse counting is the subjective feeling of exertion. We should not underestimate people's ability to regulate work intensity in relation to the effort they feel they are making. Normally we do this when exercising. When exercise is felt to be too demanding, a person slows down until he has recovered enough to increase the intensity again.

If we want to supplement exercise prescriptions in the form of statements concerning physical conditions (such as distance, time, speed, and so on) and physiological responses (for example, pulse rates) with subjective estimates of the perceived exertion, we should train patients to rely on the perception of the exertion that is just right for them. In this connection it is important to know that different kinds of physical activities might cause different degrees of subjective exertion in relation to heart frequency. If it is important to avoid high heart frequencies, lack of knowledge concerning these things might be somewhat dangerous. In a training period after an illness it is important to check the effect of the training. This, however, often cannot be done in a laboratory, so there is need for a very simple test that anyone can use. From the point of view of motivation it is also important to be able to

check one's working capacity fairly often and follow the change due to training.

A simple fitness test can then be associated with an ordinary day-to-day activity such as walking, in which the technique required to execute the movements is habitual. The difficulty in controlling the speed at which one moves is especially great in maximum exertion. For this reason maximum exertion is avoided so that the circulatory organs are not burdened "unnecessarily." The individual is, instead, allowed to walk at a moderate pace or jog slowly for a certain distance, for example, 1 km (kilometer). The course should be relatively flat and suitable for a normal stroll. It is important here that subjects walk at a constant speed. This is not likely to be a problem as long as they keep to a normal "walking distance" and do not have to stress themselves too much. The time required to cover the distance together with the pulse rate is taken immediately after completing the course. After a short rest period, the performance is repeated, this time with slightly greater effort, though not as much as maximum effort. In this manner, two (or more) time and pulse recordings are obtained that differ somewhat from one another. In the calculation of fitness using this method, a measurement is thus obtained from the pulse-speed diagram in the form of the speed for a certain reference level of pulse rate. This value can be compared with previous or subsequent values or with the values of other individuals.

In this test the dependent-independent variable system is changed in an unusual way compared with ordinary tests. Speed is not used as an independent variable but is, instead, permitted to vary from subject to subject, depending upon the subjective speed determined by the instruction and the experience of the individual.

Studies are now under way utilizing this test. Preliminary results show that the test is useful and that the possibility of maintaining a constant speed is good. Figure 7-7 shows the small speed fluctuations in a group of male subjects ($n = 11$) who walked 1000 m at two different speeds according to the instructions (1) to walk at a normal and just right speed and (2) to walk as fast as possible, but at a constant speed. Since the validity is to some degree self-evident, we would suggest the use of the test as a simple "home test" which would allow for a constant check of endurance fitness and thus may also motivate persons to engage in further training.

To evaluate the effect of physical training on certain psychological functions, such as perceived exertion, we need a model like the one presented in Figure 7-8. In the figure S stands for physical intensities with measurements of physical performances being expressed in S units. Response values are plotted along the vertical axis. In psychophysical experiments we cannot make any direct comparisons of the raw values, but have to use some kind of relative response values. To make this possible the maximal or terminal (t) values are anchored at the corresponding stimulus intensities. Two curves are

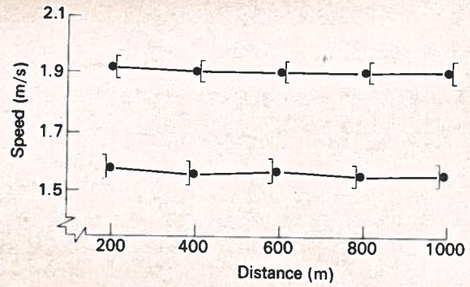


Figure 7-7. Mean speed fluctuation (including the standard error at each checking point—after 2000 m) for a group of male subjects ($n = 11$) walking 1000 m at two self-determined speeds according to two different instructions.

presented in the figure: curve 1 shows the *R-S* relation before training and curve 2 shows the *R-S* relation after training. According to the model the maximal physical intensities are set to be subjectively equal, and the range from zero (or a very low value related to the absolute threshold) to the terminal is used as a frame of reference. The intensity of a response (for example, subjective force) depends upon its position within the subjective range, which in turn depends upon the stimulus range in question and the type of *R-S* function.

If a man, for example, has trained his muscular strength so that the heaviest weight he can lift has increased from S_{t1} to S_{t2}, the subjective feeling of how heavy a submaximal weight S_x is should diminish according to Figure 7-8.

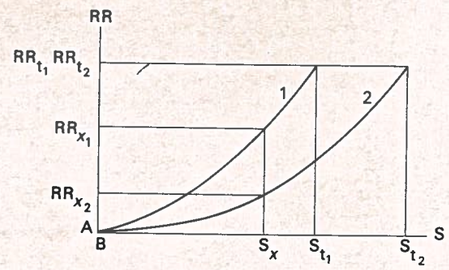


Figure 7-8. The figure shows a model for interprocess comparisons including evaluations of the effects of training. Relative response values (RR) are plotted against stimulus intensities (S). S_{t1} is the terminal threshold (for example, the heaviest weight a person can lift) and S_{t2} the same kind of threshold but after a period of training. In the figure *A* and *B* show the starting point of the curves. *Sx* is a submaximal intensity level that gives rise to the subjective response RR_{x1} before training, and RR_{x2} after training.

Mathematically the model may be described in the following way. In the general stimulus response function $R = a + k(S - b)^n$, where R is the intensity of the response, a and b are basic intensity levels showing the starting point of the function, S is the stimulus intensity, k is a constant, and n is the exponent. The constant k is derived from (Borg, 1961, 1970a):

$$k = \frac{R_t - a}{(S_t - b)^n}$$

Two individual curves may then be drawn in the same diagram showing the differences between two occasions, or two subjects, on a series of submaximal intensity levels. Relative response values may then be calculated in the following manner:

$$R_x = \left(\frac{S_x - b}{S_t - b}\right)^n$$

This method of calculating relative response values may also be of value in other kinds of interprocess comparisons, for example, when physiological raw values might be misleading as indicators of the intensity of physical stress or disease.

Self-Appraisal and Physical Fitness

The way an individual perceives himself is an important personality characteristic. Many psychologists have worked with "self-concepts" and "self-theories," for example, Mead (1934), Horney (1950), Rogers (1951, 1959), and Stephenson (1953). In the self-theories, personality disturbances are set in relation to the difference between the "self" as an individual sees it and his "ideal" self. Another important comparison is the difference between the "self" as perceived by the subject and his characteristics as described by ordinary test methods. Such a comparison provides a basis for analyzing the difference between the "self" evaluated by the individual (subjectively) and the corresponding attributes as they "really are" (objectively). The concept of "reality conception" is now introduced in this connection and is generally defined as the difference between subjective and objective measurements.

An accurate self-appraisal is of great importance for good adaptation to modern society. This is true of physical as well as mental attributes and capabilities. A person taking part in a training program after a severe infarct or a minor sickness may underestimate his actual capacity, and thus avoid all kinds of strenuous activities. By doing this he becomes more and more unfit and unable to manage an occupation or take part in leisure time activities. Or, he may overestimate his capacity and stress himself too much.

The way a subject appraises his own muscular strength and endurance

capacity in relation to his measured capacity has been studied in a group of 70 middle-aged men who took part in a study of some physical characteristics, conditioning, and coronary risk factors (Bar-Or et al., to be published). A simple rating method was developed to get measurements of self-appraisal. The method functioned well, and positive correlations were found between self-appraisals and ergometer measurements of working capacity, with most correlations being between 0.30 and 0.40. The correlations were low but significant and may be used in some predictive studies. Obviously there is, however, much room for many individuals to get to know their own capacity better. This is important with respect to exercise prescriptions, so that the right meaning of the prescription is given and comprehended by the individual.

The Relation Between Physical Activation, Exertion, Working Capacity and Some Psychological Functions

Since the time of the Greek philosophers there has been an interest in the relation between Psyche and Soma. According to modern philosophy man cannot be divided into two separate parts, mental and physical; the psychological and the physiological functions are, on the contrary, integrated into a complex configuration. In modern medicine the existence of psychosomatic diseases shows very clearly the interdependence of these two "entities"; somatic disturbances have psychological effects and vice versa. The Greek expression "Mens sana in corpore sano" seems more valid today than ever.

According to anecdotal sports information and the general experiences of many people, a positive correlation exists between physical fitness and mental capacity. Curiously enough, very few studies of an empirical nature have attempted to substantiate this claim. However, a few studies have been carried out concerning the relation between physical activation, exertion, and certain psychological functions. In some of these studies physical work has been used to manipulate the degree of "arousal" and its effect on psychological functions. In accordance with the activation theories of an inverted U relationship between arousal and performance, the best performance occurred during a moderate degree of arousal. Elliott (1964) found that auditory time was shortest under a moderate degree of arousal. Sjöberg (1969) also found evidence to support the inverted U relationship in a reaction time experiment where activation was manipulated by work on a bicycle ergometer. In the studies by Borg, Edström, and Linderholm (1966) and Borg (1969), certain small changes were found in psychomotor and memory functions after moderate to hard physical work. The function most sensitive to physical stress was hand-arm steadiness, which began to deteriorate shortly after the onset of light physical stress and deteriorated further and further according to a somewhat positively accelerating function (Borg, to be published).

On the basis of findings from a few experimental studies and some field experiments there seems to be a small but positive correlation between physical fitness and mental functions such that people who are more physically fit are also more stable with respect to many psychological characteristics. Most people also agree that good physical fitness has a positive, therapeutic effect and gives a feeling of well-being, which might be one of the most important effects of physical exercise.

REFERENCES

Astrand, I.: Aerobic capacity in men and women with special reference to age. *Acta Physiol. Scand.* **169**:1–92 (1960).

Astrand, P.-O.: *Experimental Studies of Physical Working Capacity in Relation to Sex and Age*. Copenhagen, Munksgaard, 1952.

Astrand, P.-O. and I. Ryhming: A nomogram for calculation of aerobic capacity (physical fitness) from pulse rate during submaximal work. *J. Appl. Physiol.* 7:218 (1954).

Atkinson, J. W.: Towards experimental analysis of human motivation in terms of motives, expectancies, and incentives. In J. W. Atkinson, (ed.), *Motives in Fantasy, Action, and Society*. Princeton, N.J., Van Nostrand, pp. 288–305, 1958.

Atkinson, J. W. and N. T. Feather (eds.): *A Theory of Achievement Motivation*. New York, Wiley, 1966.

Bar-Or, O., J. S. Skinner, E. R. Buskirk, and G. Borg: Physiological and perceptual indicators of physical stress in 41 to 60-year-old men who vary in conditioning level and in body fatness. To be published.

Borg, G.: Interindividual scaling and perception of muscular force. *Kungl. Fys. Sällsk. Förh.*, **12**:117–125 (1961).

Borg, G.: *Physical Performance and Perceived Exertion*. Lund, Gleerup, 1962.

Borg, G.: Bestämning av motivationens inverkan på fysisk prestation. *Nord. Psykiat. Tidskr.*, **18**(6):591–596 (1964a).

Borg, G.: A note on some psychophysical problems. *Educ. Psychol. Res. Bull. Umeå Univ.*, No. 4, 1964b.

Borg, G.: Om bestämning av fysiska "maximalarbeten" och möjligheten att predicera dessa utifrån subjektiv ansträngning. *Rapp. Pedagog. Psykol. Inst., Umeå Univ.*, No. 6 1966.

Borg, G.: Ett flexibelt arbetsprov med styrning av arbetsbetingelserna. *Psykol. Unders., Klin.-psykol. Lab., Umeå Univer.*, No. 5, 1967.

Borg, G.: The three-effort continua in physical work. *Proc. XVIth Int. Congr. Appl. Psychol.*, Amsterdam, pp. 394–397, 1968.

Borg, G.: Den fysiska ansträngningens inverkan på reaktionstid, flickerfusion och handstadighet. *Report from the PA-Council*, Stockholm, pp. 0023, 1969.

Borg, G.: Relative response and stimulus scales. *Rep. Inst. Appl. Psych., Univ. Stockholm*, No. 1, 1970a.

Borg, G.: Perceived exertion as an indicator of somatic stress. *Scand. J. Rehabil. Med.*, **2–3**:92–98 (1970b).

Borg, G.: The perception of physical performance. In R. J. Shephard (ed.), *Frontiers of Fitness*, Springfield, Ill., Charles C Thomas, pp. 280–294, 1971a.

Borg, G.: Psychological and physiological studies of physical work. In W. T. Singleton and D. Whitfield (eds.), *Measurement of Man at Work*, London, Taylor and Francis, pp. 121–128, 1971b.

Borg, G.: A ratio scaling method for interindividual comparisons. *Rep. Inst. Appl. Psychol., Univ. Stockholm*, No. 27, 1972.

Borg, G., N. Cavallin, C.-G. Edström, and G. Marklund: Motivation and physical performance. *Rep. Inst. Appl. Psychol., Univ. Stockholm*, No. 19, 1971.

Borg, G., and H. Dahlström: Psykofysisk undersökning av arbete på cykelergometer. *Nord. Med.*, **62**:1383–1386 (1959).

Borg, G., and H. Dahlström: The perception of muscular work. *Umeå Vetensk. Bibl. Skr.*, **5**:1–26 (1960).

Borg, G., and B. Edgren: A study on adaptation to short-time work on bicycle ergometer with some implications for the validation of ratio estimations, 1972. To be published.

Borg, G., B. Edgren, and G. Marklund: A flexible work test with a feedback system guiding the test course. *Rep. Inst. Appl. Psychol., Univ. Stockholm*, No. 8, 1970a.

Borg, G., B. Edgren, and G. Marklund: A simple walk test of physical fitness. *Rep. Inst. Appl. Psychol., Univ. Stockholm*, No. 18, 1970b.

Borg, G., B. Edgren, and G. Marklund: The effect of training on heart rate and perceived exertion in physical work. To be published.

Borg, G., and C.-G. Edström: Motivation och fysisk prestation. *Rapp. Pedagog.-Psykol. Inst., Umeå Univ.*, No. 1, 1964.

Borg, G., and C.-G. Edström: Om några motivationsindikatorer vid fysiskt arbete. *Psykol. Unders., Klin.-Psykol. Lab., Umeå Univ.*, No. 1, 1967.

Borg, G., C.-G. Edström, and G. Marklund: Arbetsmotivation. Differensen mellan observerade och förväntade fysiska prestationer. *Psyk. Unders. Klin.-Psykol. Lab., Umeå Univ.*, No. 6, 1967a.

Borg, G., C.-G. Edström, and G. Marklund: En cykelergometer för fysiologiska och beteendemätningar. *Psykol. Under., Klin.-Psykol. Lab., Umeå Univ.*, No. 10, 1967b.

Borg, G., C.-G. Edström, and G. Marklund: A new method to determine the exponent for perceived force in physical work. *Rep. Inst. Appl. Psychol., Univ. Stockholm*, No. 4, 1970.

Borg, G., C.-G. Edström, and G. Marklund: A bicycle ergometer for physiological and psychological studies. *Rep. Inst. Appl. Psychol., Univ. Stockholm*, No. 24, 1971.

Borg, G., C.-G. Edström, and G. Marklund: Effects of the rate of the work load increase on terminal thresholds for physical work. *Rep. Inst. Appl. Psychol., Univ. Stockholm*, No. 25, 1972.

Borg, G., K. Egerman, E. Freeman, and T. Gust: A study of physical and perceived exertion. *Rep. Pennsylvania Rehabil. Center*, Nos. 4 and 6, 1969.

Borg, G., and H. Linderholm: Perceived exertion and pulse rate during graded exercise in various age groups. *Acta Med. Scand.*, Suppl. 472:194–206 (1967).