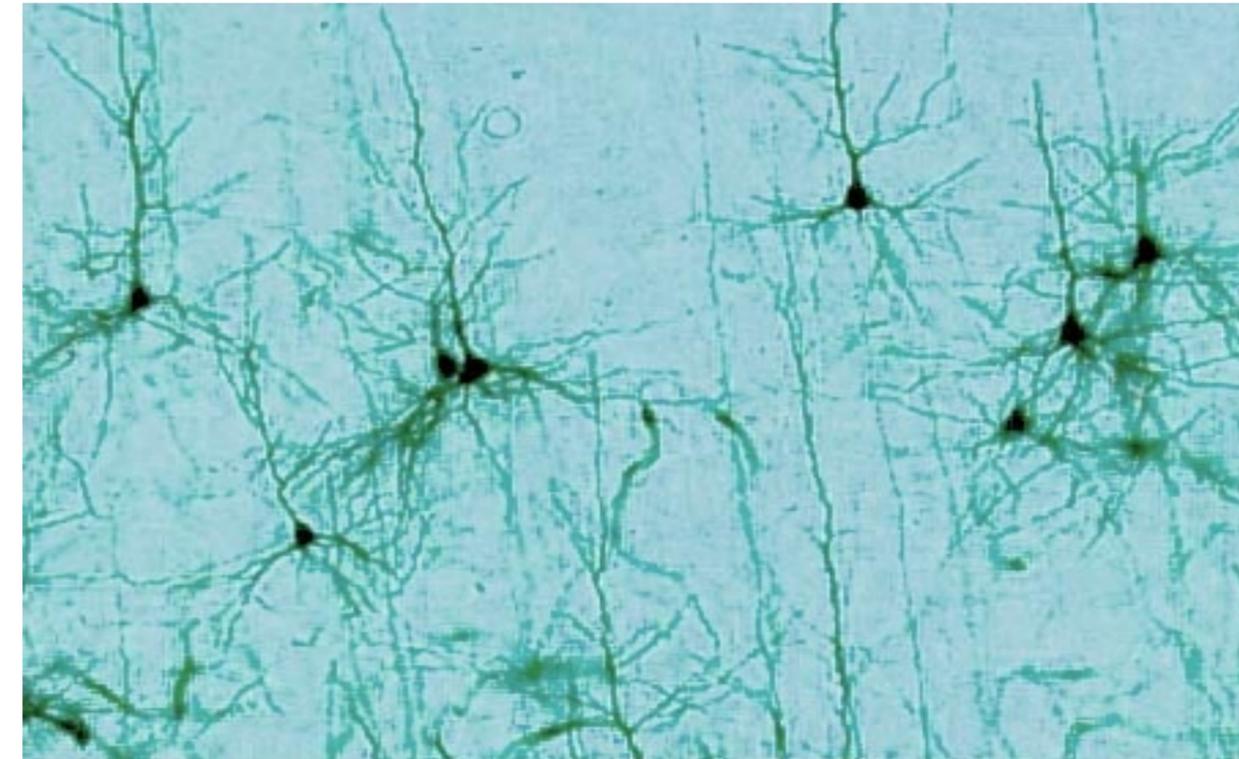


THINKinG?



What we need to know



Fig. 4a. A group of neurons

Thinking?

1.) Introduction

This section will discuss the research and paradigms that affect thinking and the mind. As an introduction the history of thinking and the mind is considered, which also serves to explain the place such a centre might have in society. Research and activities such as environmental psychology, neuroscience and healthy lifestyles will be described and conclusions will be drawn about their impact on the design of a Mind Development Centre.

2.) Factors in mind development

2.1.) The mind in society and the workplace

As the world changes, the importance attached to different skills and abilities change to meet new demands. Currently the mind is becoming a significant topic in research and there is an increasing realisation of the importance of well developed mental skills.

The mind took humankind from hunting-gathering and turned it into an agrarian society (Fig.4.1). Cities evolved and civilisations sprang up (Fig.4.2). Surplus production allowed specialisation and new trades to develop, providing ever more tools for ever more complicated tasks.

Early fireside thinking about the nature of the stars and the gods evolved into philosophy and gave rise to the sciences (Fig.4.3). Eventually, thinking and learning became a pursuit in its own right. Lyceums, schools, academies and universities gradually emerged (Fig.4.4 and 4.5). Initially these were the privilege of the few.

As we came to understand more of the world, its laws and principles, the Renaissance occurred. Knowledge came to be valued and families like the De Medici built a reputation on their quest for and collection of knowledge. This pool grew and soon the Industrial Revolution shook the world.



Fig. 4.1



Fig. 4.2



Fig. 4.3



Fig. 4.4



Fig. 4.5

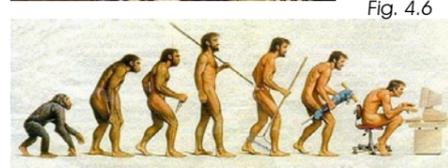


Fig. 4.6

Steam power and machines supplied power unattainable by human muscle. The nature of labour changed from primarily muscle power to operator. Specialisation increased and with it, knowledge grew more abundant.

The ability to remember and to acquire new skills became more important. Newspapers disseminated news and ideas on a massive scale. Long distance communication developed, allowing the effortless exchange of ideas among geographically separated people. Technology developed further and gave rise to electronics and the transformer, evolving into computers.

Learning new skills became ever more important, but the storage capacity of the new electronic devices that became available challenged the role of the brain as the primary vessel for knowledge (Fig.4.6).

The fast pace of change and the requirements for acquiring new skills continually, combined with standardisation due to industrial practices, led many corporations to implement procedures. By following a specified set of instructions, a large number of employees could perform the required tasks with minimum effort. A few 'thinking' individuals came up with recipes to guide the work of the other employees. Efficiency was raised and the system worked well, but the brain was back to muscle power – not thinking, just doing. In Duffy, Laing and Crisp this is discussed as one of the basic premises of Fordist management and manufacturing practises (1993 p.33).

Many companies have now realised that procedures are useful and serve a purpose, but only up to a point. Change not only often requires procedures to be adapted, but the variety of challenges confronting employees make it impossible to write procedures general enough to cover all eventualities, yet be specific enough to be easily applicable. In many parts of the world, multi-national corporations are realising that the procedures developed in their country of origin does not translate well into other countries, because of cultural, geographic and other factors. These principles are in line with Post-Fordist theories (*ibid* p.33).

A further attribute of procedures is that it constitutes an algorithm.

It is an easy task to write a computer program from an algorithm, resulting in computers taking over these tasks. Humans need to find a new function in the workplace.

These factors lead to the need for a principle-based approach. If employees understand the how's, the why's and what's, they can apply reasoning to any situation they might be confronted with. People will be empowered to manage the situations that arise. Moving from procedures to principles seems like a simple solution. Several factors serve, however, to complicate this:

2.1.1.) Inadequate education in reasoning and application

Society has so far required a few exceptional people to do the thinking for everyone else. The majority of people just had to be able to follow a procedure. Radical development of skill in reasoning and general education will be needed.

2.1.2.) Resistance from the workforce

Procedures provide a safe place from which to operate. If an employee follows the procedure and something goes wrong, the procedure is to blame, not him or her. De Bono states that the purpose of thinking is to eliminate the need for further thinking. The mind will not do more than the bare necessities automatically.

2.1.3.) Lack of management skills

Doing quality control in a standardised, procedurised workforce is relatively easy and does not require much leadership or vision. Management can, in fact, be procedurised in an adequately procedurised environment. The shift from boss to leader in management attitude is needed and many managers might fear for their positions and status if this shift was to occur.

2.1.4.) Educational facilities

As more high-level skills are needed, more and more people attend institutes of higher learning. This leads to many high-level institutions embracing an education for all policy. A void is left on the high-level end of the scale.

As the work environment continually expects more than just primary and secondary education, schools are increasingly buffered from the need to provide adequate education by institutes of further education. This is especially true in a situation where primary and secondary education is under financial and other pressures, as is a problem in many parts of the world.

According to Professor Pieter Kachelhoffer, there is a universal trend towards universities taking on the nature of primary and secondary education ("*Universiteite raak al meer skools.*") (2003). The high-level skills needed in the world today are the first to be jeopardised by this change.

2.1.5.) Fear of mistakes

Society is exceptionally success driven and failures are seldom tolerated. Mistakes are costly, but they also provide great learning opportunities. A person who is not willing to risk making a mistake is also unlikely to achieve or invent anything of consequence. A radical rethink of failures and mistakes are needed in societal thinking and corporate/ institutional policies.

Several quotes will serve to illustrate the important effect that fear of mistakes have on our functioning:

- "For more people to become entrepreneurs, we have to change our attitude towards those who fail." – Lee Kuan Yew, former Prime Minister of Singapore, quoted in Buzan (2001 p.125).
- "A man's errors are his portals of discovery." - James Joyce (*ibid* p.127).

- "We became uncompetitive by not being tolerant of mistakes ... you can stumble only if you're moving." [Ellipses in used text] – Roberto Goizueta, CEO, Coca-Cola Inc. (*ibid* p.133).
- "The person who never made a mistake never tried anything new." Albert Einstein (*ibid* p.133).

Current research and scientific philosophy continues to battle with an understanding of the nature, function and mechanics of the mind. Many benefits can be gained from such an understanding in fields as diverse as medicine, psychology, sociology and artificial intelligence.

An interesting contemporary theory (Hameroff 1998 p.119) holds that the mind might be a function of the cerebrum as well as a function of fundamental reality. This theory combines the two dominant Greek views of the mind, which have influenced most of our own understanding thereof.

Challenging the brain as computer view, Hameroff describes the complex activities in which single celled organisms engage in, without the presence of nerve cells. Following this is a discussion of the enormous abilities of the neuron (*ibid* p.119) and he asks whether the neuron, being alive, might influence consciousness.

He then describes and challenges some of the 'mind-as-fundamental-reality' theories. Through an explanation of quantum phenomena, it is described how the two theories could be combined through the inclusion of quantum mechanics in the functioning of consciousness (*ibid* p.120-124).

This theory is highly controversial and cannot currently be proved or disproved. It is, however, interesting for its combination of theories as well as the suggestions of a greater mind that emerges from this view.

Thinking?

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2.2.) Environmental psychology

Thinking and the effective use of the mind is affected by more than societal influences. Environmental psychology is a branch of psychology devoted to the study of the influence that environments have on people on a psychological level as well as a study of the way people think about environments.

The field overlaps with the disciplines of psychology, the built-environment professions, medical science, environmentalism and the study of productivity.

Environmental psychology is defined by Bell, Greene, Fisher and Baum as "the study of the molar relationships between behaviour and experience and the built and natural environments" (2001 p.6). It therefore takes a holistic approach, with a recognition that the same phenomenon could lead to different behaviours in different contexts. This leads to the field relying only somewhat on laboratory experiments.

An example of the variation in consequences within different environments, is Kuo and Sullivan's study of vegetation and crime in inner city areas (2001a p. 345-6 and 348). In non-residential areas, vegetation is associated with crime and fear thereof. In residential areas, on the other hand, vegetation is associated with a reduction in crime and a greater feeling of safety.

The difficulty in conducting laboratory experiments is explained through the example of crowding. "Because residential crowding is a *chronic* condition lasting for months or years, it is unrealistic to assume that one could reproduce it in the laboratory with human research participants." (Bell et al 2001 p.7) [*italics in original*].

2.2.1.) Theories

One of the theories of environmental psychology is Attention Restoration Theory (ART) (Fig.4.7). "[M]any settings, stimuli, and tasks in modern life draw on the capacity to deliberately direct attention or pay attention. The information processing demands of everyday life [...] all take their toll, resulting in mental fatigue." (Kuo and Sullivan 2001b p.543).

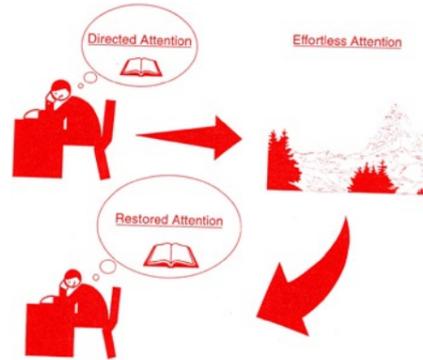


Fig. 4.7

Bell, et al refers to mental fatigue more specifically as directed attention fatigue (2001 p.50), the phrase which will be used in this text. In order to recover directed attention, it is necessary that involuntary attention be given to something different (see Fig. XA) through the vehicle of fascination (*ibid* p.50).

Natural settings provide the opportunity for fascination (*ibid* p.50) and effortlessly engage our attention (Kuo and Sullivan 2001b p.543). Furthermore, they are compatible with human wants and needs and provides the opportunity for reflection (Bell et al 2001 p.50).

According to Kuo and Sullivan, interaction between people is more considered when effortful mental processing, requiring directed attention, is used. As directed attention fatigue increases, behaviour becomes less considered, finding expression through thoughtlessness, tactlessness and unstrategic behaviour (2001b p.546.) They also point out that directed attention fatigue leads to a lowering of control over impulses. The potential impact of this in the workplace could be quite significant, particularly in the modern South African context where charges of sexual harassment and racism abound.

It has been shown that even small amounts of nature can have significant positive attention restoration effects (*ibid* p.566). People in greener areas have better attentional functioning (*ibid* p.562-563) and these areas sustain stronger social ties and support networks (*ibid* p.549 and Bell et al 2001 p.2).

2.2.2.) Findings

Noise: Environmental noise causes both emotional responses and activity disruptions in people, the first being more common (Grimwood 1993 p.). This must be in part related to the definition of noise, which includes, according to Bell et al, that it is unwanted sound (2001 p138-142).

Rafaello and Maas cites research that found the following effects of long-term exposure to noise (2002 p.652):

- Hearing loss

- Cardiovascular diseases
- Sleep disturbance
- Annoyance
- Decrease in job satisfaction and psychological well-being
- Difficulties in communication
- Increase in aggression
- Interference with prosocial behaviour
- Impairment of motor tasks
- Impairment of reading comprehension
- Impairment of problem solving

Some results show that noise might cause an improvement in work performance, but these are short-lived (*ibid* p.652).

Of the environmental noises, traffic noise is the most common. The noises with the greatest emotional impacts are those that are considered malicious or inconsiderate (*ibid* p.3). Activity disruptions are normally experienced when trying to read or write and neighbour-noise is present (Grimwood 1993 p.4).

It has been shown that the human brain is hardwired to respond to voices. Attempts to ignore it merely drain mental energy and resources that can be used more constructively. One-sided telephone conversations are particularly disruptive (nature article). Rafaello and Maas refers to research, which found that more than 50 percent of office workers are disturbed by noise, and in particular telephone and background conversations (2002 p.653). The same study shows that communication in an organisation is aided through noise control.

While job satisfaction and employee motivation is

increased by natural light entering an office, it is decreased by noise, which consequently increases the probability that an employee will leave the firm (*ibid* p.653).

2.3.) Neurological research

Since the mid 1980's it has been known that more complex environments lead to more complex brains (Wilson 2004). It was speculated that a process termed "long-term potentiation" was responsible for changes to individual brain cells. Scientists at the University of Geneva have discovered that long-term potentiation works through the duplication of connectors on brain cells, making links and communication between cells easier (*ibid*). The conclusion is that environments that are more complex can lead to an increase in mental ability.

Research indicates that environmental factors contribute to the formation of Alzheimer's Disease (Holroyd and Shepherd 2001 p.517). Although the particular factors remain largely unknown, indications are that lower educational levels and a history of depression contributes to the development of the condition (*ibid* p.517). As the neuronal changes that lead to Alzheimer's' in old age occur years before clinical symptoms are presented and because definitive diagnosis can only be made during autopsy (*ibid* p.516-7), preventative measures are a critical factor, particularly in an ageing population. Through its stimulation of interest in learning and education, this project might contribute to the delay and slowing of this disease.

2.4.) Healthy lifestyles

Many external and neurological factors that affect the ability of the mind to perform properly have been considered. Another extremely important factor is a

healthy lifestyle.

2.4.1.) Exercise

Exercise in moderation aids not only general health, but aids the functioning of the brain. Physically active people perform better on all mental tests than those that are unfit, and those that are more skilled mentally, tend to be fitter (Buzan 2001 p.147)

There are some indications that exercise might be a factor that leads to the formation of new brain cells in adults (Epstein 2001).

There are however, some indications that one can over-exercise, which impairs the functioning of the brain (Lurie 2003). Buzan states that a workout should last between 20 minutes and an hour to reduce the strain on the body and the mind (2001 p.152).

Fitness consists of several parts (*ibid* p.151):

2.4.1.1.) Aerobics

Aerobic fitness is related to cardiovascular fitness. Aerobic exercise increases the flow of blood and oxygen to the brain while improving the body's ability to use oxygen effectively, enhancing mental performance. Aerobic fitness reduces the chance of cardio-vascular diseases, some cancers and increases life expectancy.

Aerobic exercises lead to the formation of extra blood vessels in the brain, combat the effects of ageing and increase memory. Sleep is improved and a reduction in sleep requirement is observed by many people (this serves as an antithesis to noise pollution, which reduces the quality of sleep).

Leadership, which was shown to be in high demand in the discussion of the mind in the workplace, is correlated to aerobic fitness, as is mental outlook (*ibid* p. 171-184).

2.4.1.2.) Poise

This is usually defined as graceful and elegant bearing. It is a state in which the individual is in balance. People are generally so accustomed to their carriage that it feels right and proper, even though it might be far from it.

Poise affects the proper functioning of the body as it influences the organisation and function of internal organs. Lung capacity is reduced and blood-flow restricted. Nerves might become pinched and muscles need to work harder to maintain ones' position if ones' balance is wrong.

Proper poise reduces injury among athletes and ensures that the body can function properly, affecting performance and mental states. There is a positive relationship between poise and positive thinking. Research even indicates that people with proper poise are less likely to be the victims of pickpockets (Fig.4.9)! One of the best methods to develop proper poise is through the Alexander technique (Fig.4.8)(*ibid* p.153-164).

2.4.1.3.) Flexibility

Flexibility refers to the ability of the body's joints to move in all the directions for which they were created. Nerves are less likely to be pinched by areas of muscular rigidity or tension. The stretching impulse is natural in humans and other animals, while the disciplines of dance, yoga, gymnastics and Aikido provides formal stretching and flexibility exercise (*ibid* p. 184-187).

2.4.1.4.) Strength

Strength refers to the ability of ones muscles and muscle systems to lift, pull, push and rotate. Increasing strength has several benefits. Among those, most important to mental ability is increased self-confidence and the projection of a better outward appearance. Strength

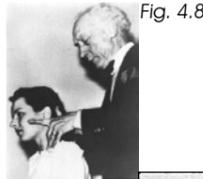


Fig. 4.8



Fig. 4.9

training is generally gained through weigh-lifting workouts (*ibid* p.187-192).

2.4.2.) Diet

What one chooses to eat or drink has a vast impact on ones health and performance. Dietary myths abound and for those who seek optimal mental and physical performance, it is important to follow a correct and balanced diet.

2.4.3.) Stress

The body responds to stress in a biochemical way. This means that the changed chemical composition of the body due to stress effects the entire body (*ibid* p.235). Research indicates a positive correlation between stress and the development of heart diseases (*ibid* p.241).

Stress, in and of itself, is a positive and necessary function – if it is short-lived and temporary, it aids us in dealing with particularly difficult or challenging situations. The problem arises from the tendency of people in modern society to be in a constant state of stress (*ibid* p.242). Stress affects the immune system, therefore those under constant or intense stress are more prone to infections

(*ibid* p.242)(considering the proportion of the South African population infected by HIV, trying to extend the quality of their lives, this is something of particular importance in our society).

Stress is reduced significantly through aerobic exercise (*ibid* p.240). There are also some other techniques available for reducing stress:

2.4.3.1.) Visualisation

Visualisation is a technique used to focus the mind on calming, pleasant or beneficial images. This aids in reducing the sensory overload and disjointed thought milling around ones head. Buzan (2001 p.245-246) describes a five-step process:

- Stage 1 – Eyes closed with eyeballs rolled upward and inward.
- Stage 2 – Fill internal visual field with a colour of ones choosing. This is followed with the visualisation of different geometric shapes and colours. When this has been achieved, movement is added to the shapes.
- Stage 3 – An object that forms in the mind unforced, and which is pleasant is maintained for as long and/or as regularly as possible.
- Stage 4 – At this stage, visualisations of abstract concepts are formed. This can be augmented with stories or allegories about the topic.
- Stage 5 – During this stage, visual manifestations of giant, overall feelings of peace and well-being is created.

2.4.3.2.) Autogenic training

Autogenic training is a method of self-hypnosis, which aids communication between the conscious and unconscious minds. It is done on a comfortable couch or bed; or in a comfortable supporting chair. Slow and

deep breathing is initiated, followed by closing and rolling the eyes upward and inward, as above. From this point, each part of the body is 'visited' mentally and ordered to relax, starting with the toes and working upward. This creates a relaxed and calm state during which the mind is particularly open to autosuggestion or self-programming. In this state, specific goals can be reinforced or affirmative messages given to the unconscious (*ibid* p.247-8).

2.4.3.3.) Meditation

Meditation is a mental exercise to focus the attention. This exercise serves to remove conscious thought from reality and the brain enters a state of calm and peaceful awareness dominated by alpha waves. Meditation is normally performed in a seated position on a firm surface, either a chair or the floor. Thoughts are focused on an internal topic of meditation, for instance ones' breathing, or on an external object, such as a leaf or flower. The aim is to absorb the essence of the object, not just to see it (*ibid* p.249-250).

2.4.3.4.) Rest and sleep

Rest is a necessary part of mental and bodily functioning. One is often most creative while at rest and this is the best time to review memories. When one engages in active learning and assimilation of knowledge, one needs rest to sort and integrate that information. During sleep, the process of dreaming serves to integrate the experiences of the waking hours. The mind also focuses on problem solving. Research has shown that a greater awareness of dreams and dreaming increases creativity, well-being and self-image, as well as provide major insights, all of which are important to mental development (*ibid* p.251-253).



Fig. 4.10

2.5.) Techniques

Some general techniques are relevant to mind development:

2.5.1.) Reduced Environmental Stimulation Therapy (REST)

During REST (Fig.4.10) treatment, a person floats in a tank filled with water in which a large concentration of salts have been dissolved. The water is kept at body temperature. A door or lid to the tank is closed, blocking out sounds and light from the outside world.

Cooper and Adams have found that REST can have the effect of producing superlearning (a highly efficient learning process in which information is more likely to be retained and to influence behaviour) and optimal physiological and psychological behaviour (1988 p.69).

Bell *et al* also mention benefits for hypertension, addiction treatment and creativity (2001 p.109).

This technique shows promise for use in the Mind Development Centre.

2.5.2.) Mind mapping

Mind mapping involves the non-linear representation of information in a "spider-diagram." Colours, images and key-words are used. The form of the map is similar to that of a brain cell and information is linked in similar ways to the connections in the mind.

Using mind maps has the benefit of involving both the left and right hemispheres of the brain in the thinking tasks at hand. This harnesses much more of the brains innate potential than would have been used in a linear fashion.

2.5.3.) Speed reading

Due to the high volumes of material people are confronted with, the benefit of increasing reading speed along with comprehension is obvious. Courses in speed reading should be presented in the centre.

2.6.) International trends

Jackson states (2003 p.376) that the priorities for CEO's in creating productive workspaces are:

- Human Resources
- People Performance
- Technology
- Designed Environments
- Workflow.

An important factor is that the workplace is experiencing change and needs to be more flexible. Workplace design is complicated by the fact that the main consideration in development is reducing capital cost, while an estimated 80 percent of performance inhibitors reside in the workplace (*ibid* p. 376).

Duffy, Laing and Crisp cite developer and institutional conservatism as a major limitation on the development of workplace design. They state that old models of office

design have become obsolescent due to the following (1993 p.xiii):

- Conventional office design is unsympathetic to environmental concerns, yet fails to provide increasingly discriminating, ordinary office workers with a satisfactory work environment
- Conventional design is not flexible enough to meet the needs of advanced information technology and its continual changes.



Fig. 4.11

Several changes have started to take shape in the workplace environment (Jackson 2003 p.382). These include:

- Shared offices (or hot-desking): Different people use desks, offices or workstations at different times.
- Satellite offices: Smaller offices away from the main office that reduce travel distance, fits ride sharing and other considerations.
- Collaborative environments: Areas for group work or places where employees can interact (Fig.4.11 and 4.13).
- Mobile working (Fig.4.12).



Fig. 4.12

Jackson believes that good design can serve to communicate an organisation's respect for its employees and establish better relations with the workforce (2003 p.390).

As communication technology makes it easier for employees to work from home, the role of the office as a place for interaction and co-operation is becoming increasingly important (*ibid* p.392).

Duffy *et al* discuss some general trends that are suggested by their research. Among the concerns that relate to layout of workspace, is the anticipation of a move in the balances between cellular office and open plan; individual and group working; more diversity to accommodate different working styles and an increase in mobility (1993 p.14).



Fig. 4.13

Workers in uncomfortable surroundings might leave earlier, be less productive or leave the organisation (*ibid* p.20). Bell *et al* confirm this when they refer to research that indicates that sunlight entering an office is related to higher job satisfaction and less intention to resign from a particular job (2001 p.2).

Workplace allocation is mostly done by staff category. The professional core of the form is most likely to have customised, dedicated workstations, while flexible and contractual labour work in open plan offices with standard furniture. They are also more likely to use multiple workstations in the office (*ibid* p.23-4).

Offices are often assigned on the basis of hierarchy and perceived need. Therefore, managers are likely to have larger offices with a view as a sign of status, in spite of the fact that they are seldom in their offices. The contractual fringe is often placed in less desirable area of the office space, even though they spend most of the time at their workstations. This is expected to change with a better understanding of the environmental impact on productivity (*ibid* p.23-4). In fact, in some firm managers have started to break away from private offices and locate themselves in open areas (Fig.4.14) where they are more accessible (Jackson p.392). This trend is often justified by the need to be accessible to employees but clearly serves to improve the general allocation of space.)

Fig. 4.14



These studies suggest that the focus should be shifted from maximising the effective floor area to accommodating greater productivity and integration of communications infrastructure.

2.7.) Research shortcomings

The study of emotion has been neglected in research in spite of the fact that they pervade our lives. Emotion serves to focus attention and the brain processes it before the onset of conscious thought. Visual stimuli directly lead to emotional responses, making it very important to designers and managers of the built environment (Adolphs 2001).

3.) Conclusions

3.1.) Greenery

From the above discussions, it is clear that ART is an important consideration in any design and that planting should be incorporated where possible.

As discussed earlier, planting is often associated with crime and fear thereof in urban areas. Kuo and Sullivan speculate that this is because of the concealment that planting provides to malefactors and suggests that planting which does not obstruct views would not have this effect (2001a p.345).

In this same discussion, they go further and propose that planting might reduce crime through two mechanisms. First, they cite evidence that greener areas are more likely to be used by inhabitants, which increases eyes on the street and implied surveillance. This then serves as a deterrent to crime (*ibid* p.346).

The second mechanism is the mitigating effect greenery has on the precursors of violent crime through the mediation of directed attention fatigue (*ibid* p.347). Further research of a similar nature describes the reduction of aggression through exposure to nearby

nature, in the form of grassy areas or trees (Kuo and Sullivan 2001b p.544).

These conclusions lead to the requirement that greenery in the design not obstruct visibility. This can be achieved by choosing trees with high canopies and through the arrangement of planters and landscaping.

3.2.) Light and views

Laying out office spaces in a way that allows sunlight to enter the spaces and which provides users with views is likely to increase productivity and performance as well as lift the moods of occupants.

3.3.) Emotions

While sufficient scientific research of emotions has not been done yet, an intuitive approach should be taken in providing for a suitable environment.

3.4.) Communication

As the office increasingly becomes a place for communication, factors that improve communication are important. This results in the need for good noise control and places where groups can interact without affecting individual workers.

3.5.) Retention of qualified staff

When the shortage of highly educated staff and the increasing demands on performance is considered, it is clear that firms that want to survive need to retain their quality staff. Losing staff involves recruitment cost, loss of production while staff is sourced and trained and a shifting corporate culture. As this void grows bigger, the cost of staff turnover in comparison to the capital cost of construction will continue to grow.

Creating an environment that will satisfy staff and encourage them to work to the best of their ability is becoming critical.