



MADE TO MEASURE

Ergonomics is the science of fitting the working environment to the human worker and draws upon such diverse disciplines as engineering and psychology, the physical sciences and physiology. It aims to discover the principles by which man-machine systems can be designed to operate efficiently while preserving the operator's health and comfort.

The arrival of personal computers in the home and workplace makes the implications of ergonomics relevant to us all. Colour and sound are good examples of how people's surroundings affect their performance at work. Some telephone switchboards relay music to callers on hold, to soothe and pacify them while they wait. A green VDU screen is found to be pleasant and restful by most computer users, whereas the more conventional white on black seems harsh and stressful after a few hours' use.

Different colour combinations provoke markedly different responses: blue on yellow is generally thought an attractive display, while cyan on green is unpopular. The colour of a room may affect its users' moods: yellows are thought to be 'cheerful', blues and greens are 'relaxing', and the typical office colour scheme of brown and grey is 'dismal'.

Such minor differences in preference may seem unimportant or irrelevant to the home micro owner, but ergonomists have repeatedly shown that when people are dissatisfied with their surroundings (often without knowing that it is the colour scheme or the background noise that is affecting them), they are more prone to eyestrain and backache, and are more likely to take time off for illness. Computer users commonly suffer from thoughtless room layouts and job structures. A major ergonomic study of one office where operators worked at terminals arranged around the edge of the room blamed their low efficiency and high error rate on the social isolation and stress caused by the layout. They found that when the workers were placed face to face at low-profile work stations in the middle of the room the whole atmosphere was lightened, and the quality of the work improved significantly.

The introduction of computers has often had a 'de-skilling' effect on jobs, making people's work undemanding, routine and uninteresting. It is now a recognised part of the systems analyst's task to make sure that the jobs allocated to people after a computer has been installed are satisfying and sufficiently demanding. In this analysis the expert



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advice of the ergonomist is needed.

A truly ergonomic system design considers the human operator as an important system component with its own operating characteristics and tolerances. Humanitarian considerations and financial logic both acknowledge that people's feelings, perceptions and habits are at least as important to the efficiency of a system as its address bus capacity or its clock rate.

The programmer can also benefit from careful study of the particular problems and demands of his job. Programming requires constant care, logical method and painstaking attention to detail, yet few people exhibit these disciplines naturally, and most resist their imposition. This is one reason why bug-free programs are impossible to guarantee.

Applying ergonomics to the design of new programming languages and system design methods is a fascinating technique, offering many benefits to programmers and their employers. Psychologists have spent years studying people as information-processing devices, and have clear (though as yet incomplete) ideas of the brain's memory structures, speeds and capacities. They can help in designing program control and data structures that people are comfortable with and can use naturally or with little training.

Psychological considerations are a long-established part of training, selection and organisation methods within industry, too. Most significantly, psychologists can ensure that

Keys To Success

In general, the user interface starts at the keyboard, which has been subject to many ergonomic improvements — from sculpted keys and dished keyboards to numeric keypads and LCD displays. But the keyboard's essential failing — the inefficiency of the QWERTY layout — seems ineradicable, because most people are reluctant to learn new typing patterns. Such typically human emotions and apparent irrationality are often the major obstacles to human factors engineering