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# Sacrifices in the name of science

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The Greek philosopher Heraclitus once said that “war is the father of all things”. In the case of ergonomics this statement especially rings true since the roots of the discipline can be traced back to the work of committees and research institutions in the UK during World War II.

With only one or two exceptions (for example, the work of Rob Stammers on research carried out by Hywel Murrell and Kenneth Craik) little information is available about this period. In the last couple of years I have been trying to unearth material in archives and libraries relating to wartime research which led up to the formation of the Ergonomics Research Society (ERS) in early 1950. Two of the questions I tried to answer were: what research did some of the founding members of the Society carry out during the war? and what ultimately prompted the need for the ERS following the war?

The outbreak in 1939 of the Second World War brought about a huge need to allocate workers and their skills to the most appropriate jobs and tasks needed for the war effort. As a result, a number of Personnel Research Committees, one for each of the Armed Forces, were set up by the Medical Research Council (MRC) in 1939 in order to investigate and provide solutions to the problem of selecting and training personnel. Within the fields of environmental psychology and physiology the Industrial Health Board was charged with studies relating to working hours, rest pauses and environmental conditions in factories. The types of environments in which war took place were more extreme than those to be found in the First World War (for example, desert conditions, tropical jungles, arctic convoys). Similarly, technology and equipment was more complex and advanced (for example, radar and sonar) and pilots, soldiers and sailors were faced with much more sophisticated weaponry compared to the 1914 to 1918 period.

The work of pilots provides one example of how precarious and dangerous the lives of servicemen could be during the war. At one time during the war, bomber crews had a one-in-ten chance of surviving a full tour of thirty sorties. Many of these fatalities came

about as a result of flying accidents and could be attributed to human error of some form or another. Aside from pilot fatigue and error, the major physiological stresses due to flying were lack of sufficient oxygen intake by pilots in the cockpit and associated spells of blacking-out during flight. These and other issues were tackled by a number of wartime research groups working under Government committees, for example, the Flying Personnel Research Committee (FPRC), the RAF Institute of Aviation Medicine (IAM) in Farnborough and the MRC Applied Psychology Unit (APU) in Cambridge.

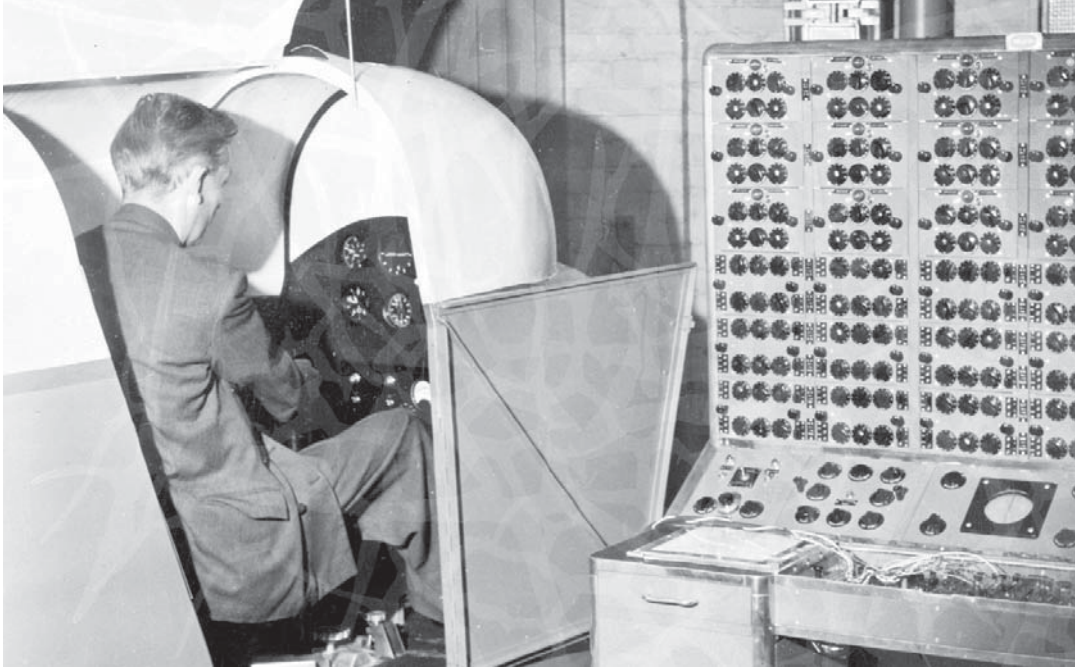
One example of work conducted during the war at IAM was the research carried out by Edgar Pask and colleagues on flying clothing. Pask is chiefly remembered for his work on survival clothing, in particular the design of life preservers for use during bail out by pilots over sea. One of the problems of carrying out simulations of the use of these types of life preservers is that it proved difficult to recreate the conditions of an unconscious man floating in water. In order to do this Pask allowed himself to be anaesthetised and immersed in water in a swimming pool (see front cover picture). As a result of carrying out the simulations, life jackets and other types of flying clothing were redesigned and helped to save the lives of many airmen during the war. Pask also carried out work on a variety of issues related to survival at sea including methods of resuscitating unconscious airmen rescued from the sea.

Kenneth Craik's work on pilot error using the Cambridge Cockpit (above right) represents one of the most well known pieces of research carried out at the APU. The cockpit was actually a spitfire cockpit donated by RAF Farnborough which was fitted with intact controls and an instrument panel similar to that used in operational sorties. All of the instruments could be mechanically operated by the experimenter. Pilots were 'sent out' on a simulated flight and their movements could be recorded and analysed afterwards.

Research using the Cambridge Cockpit was some of the first to demonstrate that skilled behaviour is dependent to a large extent on the arrangement and interpretation of displays and controls. The work helped to emphasise

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Image page 13 © MRC Cognition and Brain Sciences Unit, Cambridge.



the importance of designing controls and instrumentation design that fitted the capabilities and limitations of the operator. In a set of reports published during the war Craik describes how later work focused on a variety of topics centred around issues of control and display including research on the design of instruments, machinery and the layout and illumination of maps and panels.

The close working relationships and collaborative partnerships formed in World War II to a very large extent brought about, and fostered the development of ergonomics as a discipline in its own right. The need to solve practical military problems under time pressure and limited resources partly meant in many cases that the boundaries between disciplines were less important than the need to work towards solutions to problems. The close inter-relationship between physiological and psychological factors and the role these played in helping to suggest improvements to the design of equipment for example, also suggested new areas of scientific investigation (physiological phenomena often had psychological consequences such as stress and mental fatigue). Likewise, anatomical studies of equipment use sometimes resulted in the need for workspace design and the involvement of other specialisms such as psychology.

The availability of funding for research from Government during the late 1940s and early 1950s also did much to get ergonomics as a discipline off the ground. In 1947 the Labour Government set up a Committee on Industrial Productivity with a Panel on Human Factors. One outcome from the panel was the recognition that scientific knowledge was patchy and non-existent in some areas and as a result in 1950 it was decided that work start on two Department of Scientific

and Industrial Research (DSIR) and MRC joint committees - one on Human Relations in Industry and the other on Industrial Efficiency in Industry. Later, in 1952 a Conference on Human Relations on Industry took place and one of the recommendations from the conference was the need for academic research on "human engineering studies (fitting the job to the man)".

Within ergonomics and the ERS emerged the proposal in 1959 that the European Productivity Agency should draw up a large-scale project on ergonomics with management and labour representatives from 13 countries. ERS contacted DSIR in order to organise a similar conference in the UK. At the same time the TUC requested DSIR to bring along the results of recent research to the notice of industry. By 1958 financial support for the various committees that helped to get ergonomics off the ground and industry's interest in the human sciences had increased and "a sound nucleus of fundamental research activity had been established". The groundwork for the further development and expansion of ergonomics during the 1960s had been completed.

This article has only touched upon a few of the activities and developments that paved the way for the development of ergonomics in the UK and the eventual formation of the ERS. It's clear that library and archive material could provide the basis of an extensive and wider-ranging history of ergonomics. But much of the source material is hard to locate given the difficulties involved in cataloguing wartime research papers and Government communications. Future work should aim to investigate, for example, the material held in the National Archives in Kew, London. There is more than enough to keep historians busy for the next few years. ❖

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