

SEVENTH INTERNATIONAL CONFERENCE  
ON EVENT-RELATED POTENTIALS OF THE BRAIN  
(E.P.I.C. VII) - FIRENZE - SEPTEMBER 4 TO 10, 1983

EFFECT OF VISUAL TRAINING  
ON COGNITIVE PROCESSES AND PERFORMANCES  
IN AIR-TRAFFIC CONTROLLERS  
DURING A DUAL DECISION TASK OF INCREASING COMPLEXITY

Bernard CLAVERIE, Marie-Christine DUBROCA, Jean BERTHOMIEU  
Laboratoire de Medecine Experimentale (Prof. Jacques PATY)  
Groupe de Recherche de Psychophysiologie Cognitive  
UNIVERSITE DE BORDEAUX 2 - Carreire boite postale 40  
F.33076 - BORDEAUX CEDEX (FRANCE)

The objective of this study is to determine the influence of professional detection training of air-traffic controllers (A.T.Cs.) on information processing by analysis of the event-related potentials (E.R.Ps.) of the brain in selective focused and divided attention.

Air-traffic control (A.T.C.) is an occupation where the nature of the work (radar screen surveillance, radiophony, navigation decisions, etc.) and the implications of failure require a high level of detection training and sustained attention abilities. Although A.T.Cs. would be more efficient than ungraded subjects in focused and divided tasks.

An experiment will be performed to compare the performances of an A.T.Cs. sample and a control one, in relation to the homo- or hetero-modality of the tasks and their complexity.

Methods : Subjects have to detect targets during two sequences of contingent negative variation (C.N.V.) conditioning.

Two samples of twenteen subjects each will be studied. One of young A.T.C. officers (of about 30 years old) and one similar control sample.

Targets are random geometrical figures exposed every second on a video monitor. They are of three sizes (small, medium, large), of three types (triangle, circle, square), and of three colors (red, blue, green). Some of them are to be detected according an increasing complexity protocol in a first task and during a C.N.V. second one.

The C.N.V. stimulations are flashes (first sequence)

and afterwards auditive clicks (second sequence). The warning occurs about every twenty seconds and two seconds before an imperative series which is interrupted by the subject.

Reaction times and detection rates are measured. The electroencephalographic responses to the signals and the C.N.V. are recorded in a standard manner in Fz., Cz., Pz., P3, and P4. Averages are computerised with an automatic rejection of artefacts (E.O.G, E.M.G., etc.) for each subject and each group.

Our aim is to point out the role of an ergonomical training on the cognitive processes in professional visual detection and divided attention imperatives. This importance in brain corticographic spatial specialization, the auditory or visual preferences, and the influence of stimulus probability occurrence and complexity on decision making criteria, will be discussed in the results. This approach using E.R.Ps. will contribute to improving knowledge of A.T.C. working conditions and their adaptation to man abilities. Therefore it will benefit air traffic security.

Nota : this study is being carried out with contribution of the A.T.C. officers of the Area Control Center of Bordeaux/South-West (France).