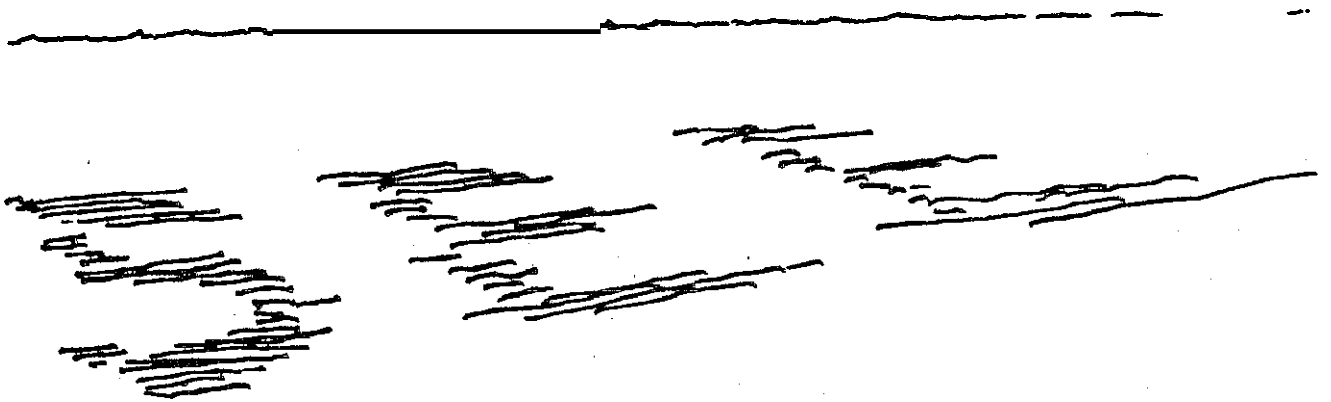


The Fifth International Conference on

Environmental Ergonomics



Maastricht, The Netherlands,
November 2-6, 1992

Proceedings

editors: W.A. Lotens and G. Havenith

The papers in this volume have been reviewed by two independent reviewers and have subsequently been revised. No emphasis was laid on language editing.

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Proceedings of the Fifth International Conference on
Environmental Ergonomics

November 2-6, **1992**, Maastricht, the Netherlands

Wouter. **A.** Lotens and George Havenith, Editors

Preface

It is a pleasure to present to you the proceedings of the **Fifth** International Conference on Environmental Ergonomics. This series of conferences is organized in turn by individual scientists **as** a service to the scientific community. The preceding meetings were held **in**:

First	Bristol, UK, 1984
Second	Whistler (BC), Canada, 1986
Third	Helsinki, Finland, 1988
Fourth	Austin (TX), USA, 1990

The first meeting was actually a workshop which had limited attendance, but there the enthusiasm was raised to address a larger group. At the second meeting the name Environmental Ergonomics was introduced, which has proven to be a satisfactory denominator for the various topics treated. Actually, the **name** is so well chosen that ergonomists working in related areas feel at home **as** well.

This series of conferences **has** gained a stable interest over the last 8 years and has developed to the leading platform for applied thermal physiology. Some related topics are covered more extensively elsewhere, however. These include hyperbaric research (Undersea Biomedical conferences), altitude research (Mountain Medicine, Aerospace Medicine), indoor **air** and comfort (ASHRAE, Indoor Air), **air** quality (Industrial Hygiene). Other topics are shared protective clothing is covered here and also by special clothing conferences (ASTM, ad hoc conferences) and thermoregulation also by the IUPS satellites **on** thermoregulation. As our central theme is ergonomics, related to environmental factors, it would be desirable to develop step by step to the multidisciplinary forum that ergonomics pretends to be.

It was attempted to use the current meeting to establish a closer scientific contact with the clothing and textile industry, but that attempt was not a complete success. Most information is provided by the laboratories and the industrial companies are in general reluctant to engage in a scientific discussion. For a healthy basis of Environmental Ergonomics research it will be necessary to continue the effort to cooperate with the industry and see our knowledge incorporated in useful products.

This is the first Environmental Ergonomics conference for which the papers were formally reviewed before acceptance in the book of proceedings. Two independent reviewers gave their comments and nearly all authors have used the comments to enhance their paper, also those whose papers were acceptable already. A couple of papers were withdrawn. The organizers are greatly indebted to the **organizing** committee members and to Hein Daanen for their effort in the refereeing procedure.

Another task the committee members and several other contact persons have accomplished is the local distribution of the announcements and the updating of the address list. By **this** method the administrative work for the organizers was strongly reduced and the success of the conference **has** become really a collective rather than an individual achievement. **In** this place we would like to thank also Els A.M. van Amerongen for her secretarial support and Sylvia Candido of VCB-VVV in Maastricht for her help on location in Maastricht. Finally, we would like to thank the TNO-organization for the time and use of facilities that we stole to do the organization.

Soesterberg, October 1 1992,

Wouter A. Lotens
George Havenith

The organizers gratefully acknowledge the support of:



W.L. Gore & Associates, Inc. USA, **UK** and Sweden



TNO, Netherlands Organization for Applied Scientific Research

The Fifth International Conference on Environmental Ergonomics

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Program/Contents

Sunday night, November 1 (University, het Kruithuis)

20:00 - 22:00 Welcome reception and registration

Mondav morning (University Aula)

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9:00 Opening of conference

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Chairman: W.L. Kenney

Co-chairman: S.D.Livingstone

Keynote address:

9:10 Individual characteristics and **response** to heat stress **page 2**
Kenney, W.L., Zappe, D.H., and Bell, G.W.

Communications:

9:50 Variability of **body** temperature response to **standardized** stress conditions **page 4**
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10:05 Inter-individual variations in physiological response to exercise while **page 6**
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1020 The effects of age and fitness **on** heart rate and body heat storage **during** **page 8**
work in a warm, humid climate
Havenith, G., Inoue, Y., and Kenney, W.L.

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Co-chairman: J. Smolander

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11:15 Heart rate, core temperature, and stroke volume **as** indicators of volitional **page 14**
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- 11:30** The heat tolerance after an acute heat illness - a follow up study among military conscripts page **16**
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- 11:45** Moving between hot dry and warm humid climates page **18**
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Co-chairman: **R.L.** Barker

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- 14:30** **Comfort** properties of single layer aramid workwear fabrics page **26**
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- 14:45** Thermal sensation and affect during work in the cold page **28**
Maw, G.J., Boucher, **S.H.** and Taylor, **N.A.S.**
- 15:00** The thermal discomfort of wearing ballistic vests page **30**
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- 15:15** Clothing effect on thermal sensations; Evaluation by transients modelling page **32**
Thellier, F., **Serin, G.**, Monchoux, F., and Cordier, **A.**

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chairman: J. Frim

Co-chairman: E.A. Goodfellow

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| 16:15 | An in-ear active noise reduction device
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| 16:30 | Determination of clothing comfort properties with the sweating thermal
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| 16:45 | Evaluation of an infra-red tympanic thermometer during cold water
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| 20:00 | Environmental Ergonomics: Future developments
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| 2050 | Quality of contract research
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Co-chairman: I. Holmér

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Co-chairman: R. Nielsen

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Chairman: V. Candas

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Co-chairman: P. Tikuisis

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This excursion was generously sponsored by **W.L. Gore & Associates**

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Chairman: J. Sawicki

Co-chairman: B. Farnworth

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Co-chairman: H. Tokura

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