Overview maintenance in man-machine environments : applications in ship navigation
Aarts, L.T.

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PART I: THEORETICAL INTRODUCTION

This dissertation examines situation monitoring in the context of complex man-machine environments. Situation monitoring in these contexts requires the ability to synthesise information from numerous sources in order to develop an overview of the current situation. Performance is based on this overview. Maintaining overview is of particular importance in ensuring that tasks are performed when required. However, paradoxically, task performance may distract the operator from overview maintenance. When an operator focuses hard on one task, his attention narrows, resulting in failing to monitor other information sources, in this way impairing the operator’s overview. Attention narrowing can occur for lengthy time periods, and may persist despite warning signals. Therefore, attention narrowing is a likely contributing factor to many accidents within man-machine environments.

Most research into human performance in complex man-machine environments has focused on performance in process control and aviation. Little is known about human behaviour in shipping, and yet the results of failure to maintain an effective overview of the situation can be disastrous. As a general introduction, chapter 1 discusses the setting of the ship’s bridge, the job of the watch officer and the problems he¹ may encounter. This information is important to understand the embedding of overview maintenance, and may help to understand the applied experiments of this dissertation.

After the general introduction of chapter 1, chapter 2 focuses in a theoretical way on the concept of ‘having overview’. To make clear what this dissertation means by ‘overview maintenance’ and ‘loss of overview’, these concepts are defined. Since ‘having overview’ is not a commonly used term in literature, the definition of the concept is also useful in the search for links with research into related topics. Inspired by literature on related topics, three main factors are distinguished that may provoke loss of overview. They include: 1) the influence of information characteristics on focus behaviour, 2) the nature and existence of structural individual differences in the ability to maintain overview, and 3) the effects of the operator’s psychological state on maintenance of overview. In the context of the psychological state, the effects of motivation and fatigue are discussed. These three factors are the basis for the examination of overview loss in the empirical second part of this dissertation.

¹ In this dissertation, the male form is used to represent both sexes if this is undetermined.