Crowd Safety Architecture - Measuring Safety Levels

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INTRODUCTION

Guiding football fans or supporters to their favourite pastime has become an increasingly delicate matter. The cost to the public purse of police supervision during football matches has become extremely high. Consider the recent case when two matches were played instead of one so as to exclude visiting supporters (Ajax versus Feyenoord).

A specific location (FC Twente's "Grolsch Veste" stadium) allows research to be carried out on how to optimize the process of guiding supporters from the train station to the stadium [1].

The hypothesis states that smart guidance compensates for the sense of danger. Smart guidance here focuses on either separating or combining flows of supporters in relation to other pedestrian and cyclist traffic.

Both the approaches dealt with in this research proposal are to be implemented in a real-life situation and in an architectural design.

RESEARCH QUESTIONS

The questions to be considered are:

- To what extent can a virtual model correlate with an actual physical site?
- Is visiting the site prior to engaging in the virtual environment mandatory for deriving valid conclusions?
- To what extent does mingling the general public with supporters diminish feelings of comfort and safety?
- Does optimizing the situation require complete separation of supporters, the general public, and cyclists?
- Does physical separation by means of transparent barriers in fact create a feeling of caging, which will be counterproductive to establishing a safe environment?[2]
- Can the situation be improved by constructing a "supporter-proof" cycle bridge (in the form of a folding cage), combined with cycle parking facilities?

TYPE OF RESEARCH

The research involved is empirical with an inductive approach. Based on specific observation of behaviour, an attempt will be made, on the one hand, to deduce general rules. On the other hand, it is assumed, as a deductive hypothesis, that smart separation of supporters from the general public will enhance the feeling of safety.

The research will consist of questionnaires administered at specific intervals while subjects explore the virtual environment. A survey will therefore be combined with a case study in order to test the hypothesis.

Depending on the number of measurements, the research will primarily be qualitative in nature. Only limited statistical calculations will therefore be necessary.

Recording of behaviour during the simulated process of passing through and exploring the real architectural space will provide an insight into the psychological perception of spatial information.

The objective is naturally to achieve a neutral result by applying an appropriate methodology and precise focus.

RESARCH METHODOLOGY

Precise measurement can be achieved by working with four distinct groups.

The subjects will consist of:

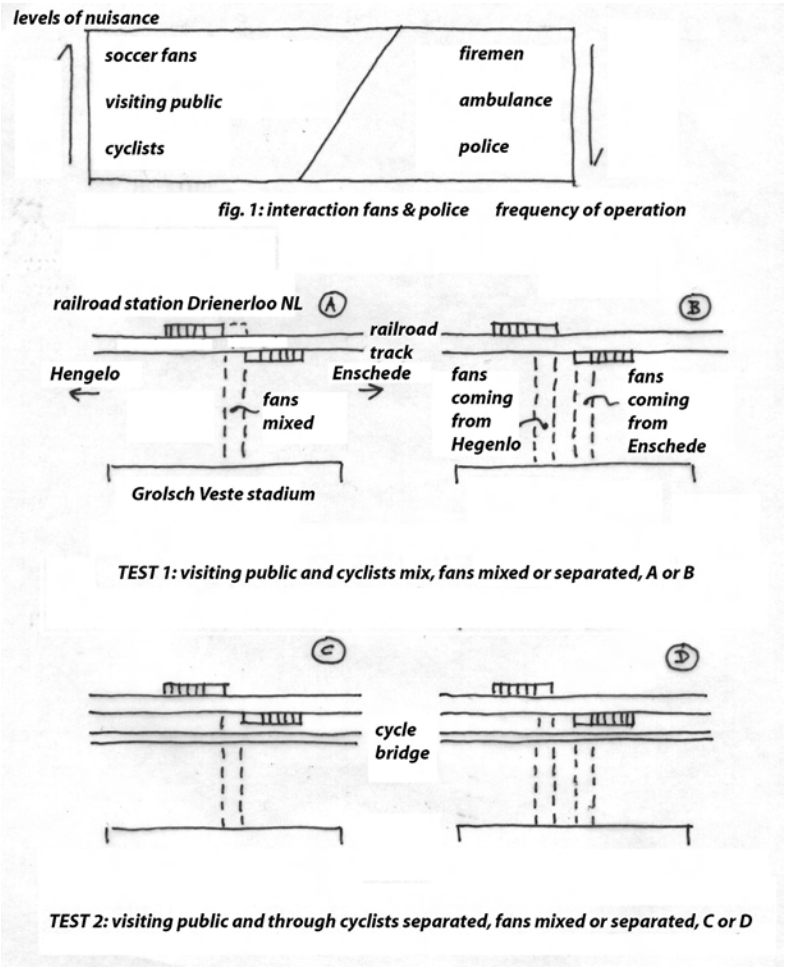
1) the general public attending the sports event;

2) cyclists passing through the area;

3) supporters;

4) police.

Test 1 REAL ENVIRONMENT: Within a given timeframe, subjects within a group explore the actual site without a cycle bridge and respond to specific questions put to them. Set-ups A and B.



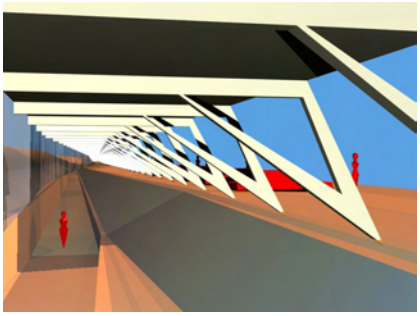


Figure 1. Test configurations and bridge design projected on site (length 432 m).

Test 2 VIRTUAL ENVIRONMENT: Within a given timeframe, subjects within a group explore the virtual model with a cycle bridge and respond to specific questions put to them. Set-ups C and D.

All subjects first work alone and then together during both tests. It may be necessary to combine different types of subject but this will depend on the results of the initial tests. Consider mixing fans with the police as depicted in Figure 1.

Moreover, relevant questions will be put regarding orientation – i.e. the mental condition of subjects before and after the tests – with the answers being compared with the actual behaviour of the subjects.[3]

IMPLEMENTATION OF RESEARCH

The actual site will be transformed into corridors by means of special fences as outlined below.

The present architectural Definite Design (see below) will be further converted into a semi-realistic environment using advanced visualization and gaming techniques.

Subjects, either as crowd members, cyclists or law-enforcement officials, will explore the environment interior – either individually or in groups – by means of computer interfaces. They will interact with computer screens while sitting on chairs at gaming consoles. This can be done at the advanced gaming facilities at the University of Twente (T-Xchange), which is directly adjacent to the study location.

This non-direct method (registration of observations) will make it possible to measure the mental process of safety assessment [4].

GENERAL CONSTRAINTS

Accurately zoned site;

Realistic model (Architectural Definite Design converted into real-life visualization);

Close correlation between physical site and design model;

Representative measurement (large enough number and proper kind of subjects);

Applicable (usable protocol for professional architects as result).

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