Designing out terrorism: human factors issues in airport baggage inspection

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Abstract

All air passenger baggage is screened at airports by means of 2-D X-ray imaging which results in a computer display of each luggage item that is then visually searched by an operator (screener) for the presence of potential threat items (e.g. knifes, guns, improvised explosive devices [IED]). Despite improvements in screener training and available technology (e.g. image enhancement functions, threat image projection, 3-D X-ray imaging) the performance of screeners is variable which leads to the potential for terrorist threat to aircraft and passengers. A new training scheme to improve performance in baggage screening is under development (EPAULETS: Enhanced Perceptual Anti-terrorism Universal Luggage Examination Training System) and some of the initial human factors issues that underlie variable screener performance are considered.

Imaging interpretation

The detection and recognition of potential threat items within cabin baggage involves a human operator inspecting and interpreting a two-dimensional (static or dynamic) X-ray image of hand luggage or clothing item. Consequently this process is similar to the task of medical image interpretation, where a radiologist inspects an image (generally two-dimensional but can be three-dimensional) of human anatomy, which may be static (e.g. chest radiograph) or dynamic (e.g. ultrasound scans). Therefore the medical image inspection task is very similar to aircraft baggage inspection and data and theoretical approaches found applicable in the former, which has a larger research base, should be able to be applied to the latter. More strictly, baggage inspection relates to a typical radiological screening situation where many normal images are inspected which leads to the detection of relatively low numbers of abnormalities. For instance, in breast screening in the UK, circa 1.5 million women are screened each year, which leads to the detection of some 10,000 cancers.

Ergonomic differences between the two imaging interpretation situations mainly concern the viewing conditions themselves. In medical imaging the image is viewed in a quiet and darkened room with no extraneous distractors, whereas in airports the image is viewed in normal room lighting with many potential distractors present. There are specific reasons for this arrangement which are not considered here.

In D. de Waard, K.A. Brookhuis, R. van Egmond, and Th. Boersema (Eds.) (2005), *Human Factors in Design, Safety, and Management* (pp. 63 - 63). Maastricht, the Netherlands: Shaker Publishing.