

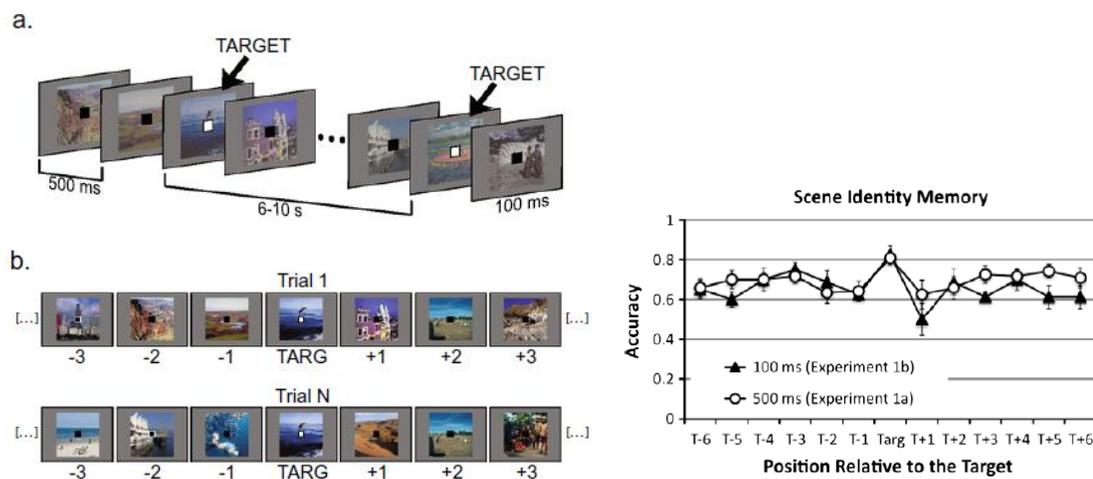
Spatially overlapping displays can enhance perception of multiple views

1. Introduction

Displays at airports convey important information to travellers; for instance, large displays show departure times; others might show airport floor plans. In this essay I take the view that these separate displays can be conceptualized as a single multiple view display system, and that organizing these displays to spatially overlap offers several advantages to spatially separated displays. Although doing this haphazardly will only create clutter and confuse the perceiver, careful use of this design strategy can usefully employ visual mechanisms of attention, object-based attention, and the gestalt law of proximity and thus enhance memory and processing speed for this information.

2.1 The attentional boost enhances memory for spatially overlapping images

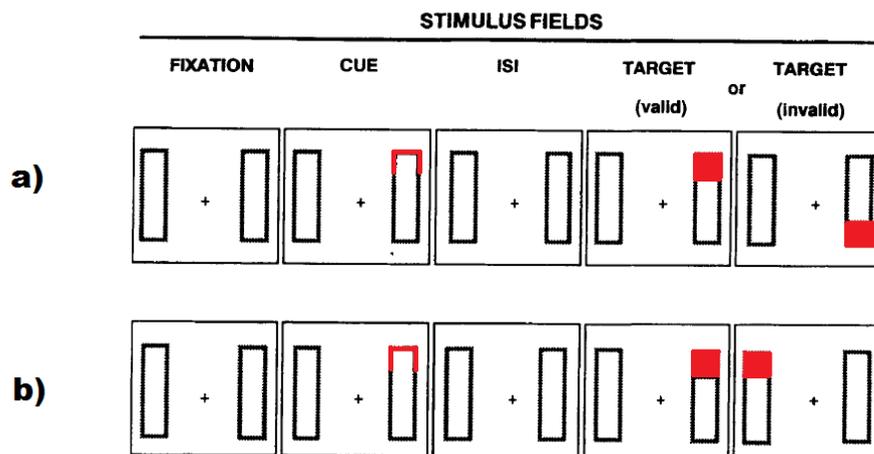
Recent studies have described an **attentional-boost** effect, whereby subjects, when told to detect a white target square among a sequence of black non-target squares, had greater memory for a natural scene displayed as a background to the target than for natural scenes displayed as a background to the non-targets [1, 2] (see Fig. 1). It is thought that attention can act as a gate, and that at relevant times (i.e., when a searched for target pops up) this gate opens to allow temporally and spatially nearby information to be more efficiently encoded [1, 2]. Spatially overlapping multiple view displays are advantageous, since an appropriate airport map can accompany departure times in a sequential display. This way, when the traveller sees his target departure time, the airport layout for that destination will be better encoded.



**Figure 1:** Memory for the scene presented simultaneous with the target is enhanced relative to memory for scenes presented with non-target items, as shown by an incidental scene-recognition task. This effect has been termed the “attentional boost” [1].

26 2.2 Object-based attention for spatially overlapping information enclosed within the same object

27 The necessity of shifting attention accounts for the increased search times for conjunctive  
 28 as opposed to feature searches; i.e., longer search times to find a red X among red Os and green  
 29 Xs than among red and green Os [3]. Researchers, however, have found that attention spreads  
 30 automatically from attended to unattended spatial areas within an object, but not to an equidistant  
 31 area outside of the object [4], (see Fig. 2). Therefore, it might be the case that bounding two  
 32 pieces of information within one object can avail the visual system of **object-based attention**,  
 33 and thus approach the efficiency of feature searches. Biasing departure time information and  
 34 airport floor plan maps to be perceived as a single object, by using a single bounding frame and  
 35 having them slowly move together (cp. Gestalt law of common fate), might allow attention to be  
 36 deployed more efficiently within this “object,” and hence allow the viewer to more efficiently  
 37 process related information.



38  
 39 **Figure 2:** Subjects are faster in response time to perceive an invalidly cued target when it is on the same object (a)  
 40 than a different object (b), even though the spatial distance from the cue is equivalent. This is evidence that  
 41 attention spreads automatically to spatially distant areas within an attended object [4].

42

43 2.3 Gestalt law of proximity ensures related information is grouped together

44 The Gestalt laws of perceptual organization describe how the visual system groups  
 45 information in a display. The **law of proximity** is a powerful grouping principle which can  
 46 ensure related information will be perceived as belonging together [3], and it can be applied  
 47 when overlapping displays of multiple views.

48 3. Conclusion

