- Friday, April 7, 1995
Coding of Features by Multiple Attributes

1.0 The YORKVIS discussion group met on Friday 7 April. Here are the minutes.

1.1 I forgot to ask if anyone wanted to present anything for the first Friday in May. That would be May 5th. What with the ARVO rehearsal day set for May 2nd and ARVO and the Spatial Orientation Conference happening May 14th, we might want to skip that day. Please let me have your opinions and suggestions for what we might do May 5th, if anything.

2.0 Jos e Rivest presented her work on the coding of visual features by multiple attributes.

2.1 The idea is that, although the visual system seems to process the different attributes of a stimulus separately (eg. colour, texture, luminance) these features all contribute to defining the same objects. Clues about the rules and mechanisms by which different attributes are combined might therefore be discovered by seeing how altering the links between ONE cue and an object feature might affect the links between OTHER cues and that same feature.

2.2 A review of how cues are known to influence each other was given. Concentrating on texture/luminance cross effects. For example, the tilt after effect can be set up with one cue (eg texture) and tested with another (eg. luminance). Some transfer is seen.

2.3 An interesting counter-example is spatial frequency/luminance. There does not seem to be a transfer of effects between these attributes.

3.0 The first experiments used the phenomenon of ATTRACTION which is known to occur between two conventional, luminance-defined edges. Two edges presented close together seem closer than they really are. When one edge is defined EXCLUSIVELY by luminance / colour / texture or motion it continues to exert an attraction on another edge defined by any of those attributes.

4.0 The second experiments looked at the phenomenon of orientation learning. The accuracy of detecting which of two possible orientations of a bar is being presented a couple of degrees into the periphery can be increased by exposure to the task with feedback.

4.1 If the exposure is to bars defined EXCUSIVELY by luminance/colour or motion, the effect transfers to a bar defined by any (or all) of these attributes. Some of the transfers seem a little small and their significance is open to doubt but certainly there is SOME transfer.

4.2 In trying to use these observations to comment on the use of multiple attributes, the following observations also have to be considered:

after training to motion only the luminance effect was retinally specific - improvement in other attributes happened wherever the test bar was presented after training with luminance, when the test bar was defined with ALL THREE attributes its improvement was retinally specific, when the attributes were tested alone the improvement happened everywhere after training with colour, the same as the effect of luminance was true in addition, when all three cues were used to define the bar it only worked in the same eye.

These measures about how general the improvements are, are clearly connected to where the effects are happening, presumably the higher they are happening, the more general the effect.

5.0 Attention to an attribute can increase sensitivity. Does this improvement transfer to other attributes? It turns out attending to colour improves the response to motion. This effect is specific to a retinal site although it does transfer from one eye to the other. Attending to motion however, does not seem to improve the response to a colour attribute.

6.0 Conclusion: there are some complex interactions between attributes! This is an exciting line of approach, in my opinion, in which we can get functional correlates of perceptual processes. Addressing these major problems of perception such as "how do the features get put back together" is a challenge.

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