

1 INTRODUCTION

We studied colour constancy with real-surface stimuli in two-dimensional (2D) and three-dimensional (3D) setups. Kraft and Brainard¹ have previously shown that colour constancy improves when more visual cues are present in the scene.

Here, we explicitly test the idea that cues in a 3D scene will allow for better colour constancy performance than in a flat 2D scene. It is also known that memory² and adaptation³ play a crucial role in colour perception and therefore, we studied the influence of these two components in our experiment as well.

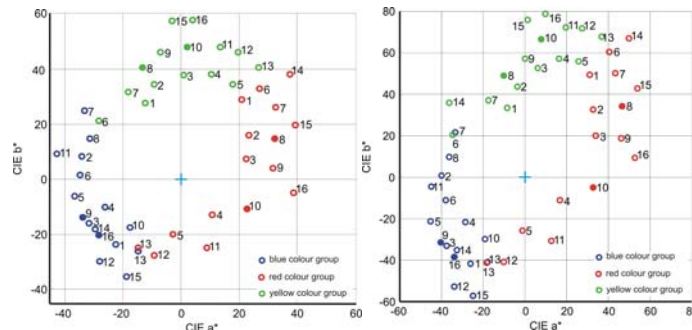
2 METHODS

- 48 colours from the Natural Color System (NCS) were chosen and divided into three groups: blue, red and yellow. Each group had 2 target colours.

- Real stimuli were presented as 2D swatches on a palette (2D) and as 3D geometrical volumes in a complex scene (3D).

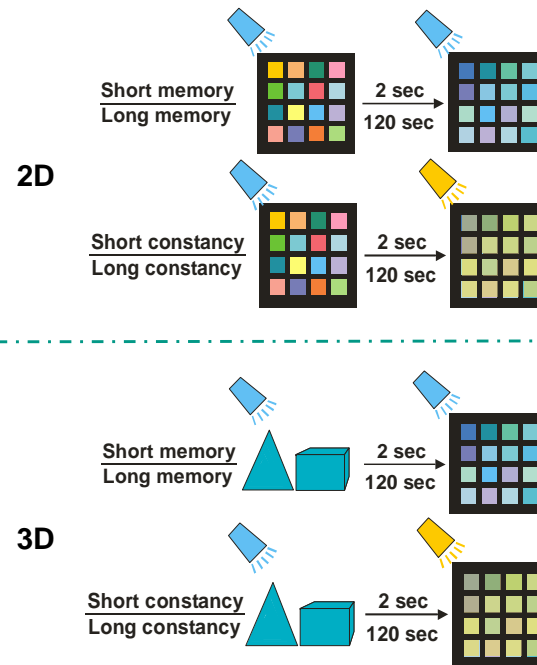


- The colour memory experiments took place under daylight illumination (6500 K) and the illumination changed from daylight to tungsten light (2100 K) for the colour constancy experiment.



The circles in the CIE a^*b^* chromaticity diagram represent all 48 swatches of the experiment under daylight (left) and tungsten light (right). Filled dots indicate the target colours.

3 PROCEDURE



- The order of the different conditions was randomised across 10 colour normal observers.
- The whole experiment took place over 8 sessions per observer.

4 RESULTS

- A three-way repeated-measures ANOVA was conducted; the factors were duration (short/long), dimension (2D/3D) and colour (blue, red, yellow).

Hit rates – memory tasks		
	Short	Long
2D	53 %	51 %
3D	54 %	49 %

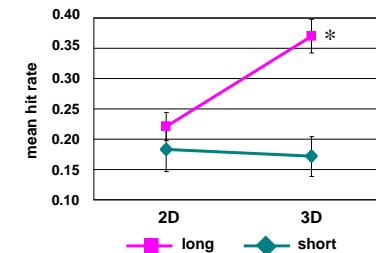
- No main effect of duration or dimension.
- Main effect of colour $F(2,18)=30.65$, $p<0.001$.

Hit rates – constancy tasks		
	Short	Long
2D	20 %	23 %
3D	17 %	37 %

- There were main effects of all three factors;
 - duration $F(1,9)=10.83$, $p=0.009$,
 - colour $F(2,18)=5.8$, $p=0.011$,
 - dimension $F(1,9)=5.53$, $p=0.041$.

- Significant interaction between duration and dimension

- $F(1,9)=14.7$, $p=0.004$



Interaction between dimension and duration for colour constancy. The error bars indicate ± 1 SE; * indicates a significant difference at $p<0.05$.

5 CONCLUSIONS

- No deterioration of memory over a 120 sec gap and the change between 2D and 3D did not improve colour memory.
- Colour constancy performance was significantly improved in the 3D scene after adaptation.

6 REFERENCES

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