

# Color Appearance Prediction of Wide Gloss Range of Halftone Prints



National Laboratory of Color Science and Engineering



1 Research Background

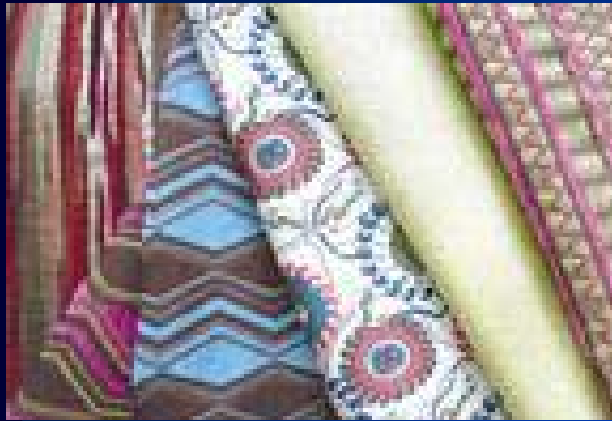
2 Research Method and Data Analysis

4 Further Work

# Research Background



The main media used for the study of color appearance model:



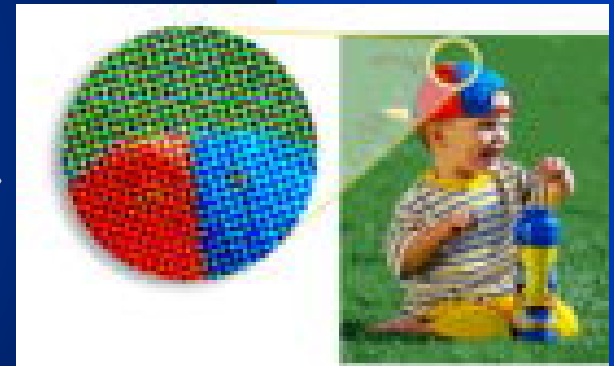
textile



Color monitor



paints



?



# Experiment Method and Data Analysis



# Experiment Method



Light  
source



**D65**(243cd/m<sup>2</sup>),**A**(232cd/m<sup>2</sup>),**TL84**(252cd/m<sup>2</sup>)

TABLE I The CIE1931 x ,y chromaticities and color temperatures of the standard CIE illuminants and real light sources

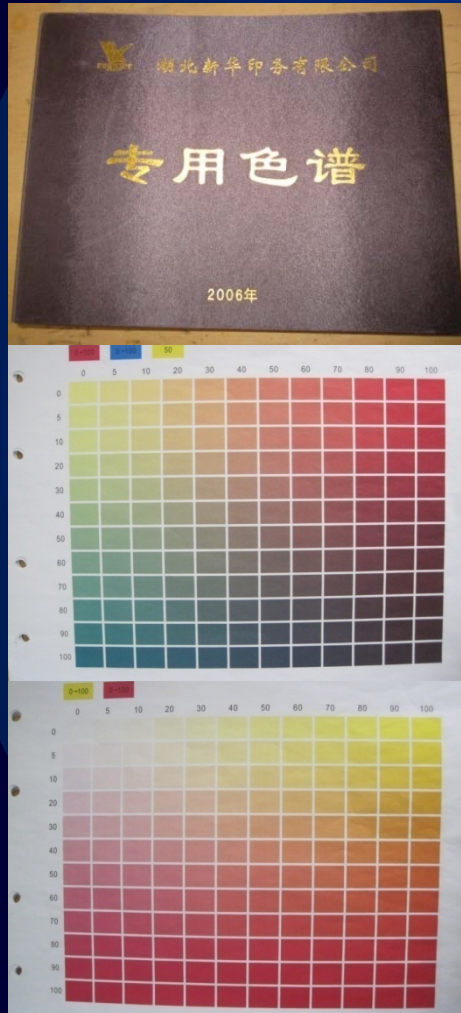
Light source	CIE		Measured		Color Temperature
	x	y	x	y	
<b>D65</b>	0.3127	0.3290	0.3219	0.3510	5949K
<b>A</b>	0.4476	0.4074	0.4555	0.4110	2765K
<b>TL84</b>	—	—	0.3831	0.3840	3982K



# Experiment Method



## Test colors



No. of colors : 360(low gloss)  
360(high gloss)

Value of gloss: High 56.3 (60 ° )  
Low 4.1 (60 ° )

Size of colors: 1.25cm × 1.65cm



# Experiment Method



Viewing distance: 60 cm

Visual angle :  $2^{\circ}$

viewing geometry :  $0^{\circ} / 45^{\circ}$

Experiment method:  
magnitude estimation





TABLE II The repeatability of CS5 color matching instrument

Light source	H		V		C	
	CV	R <sup>2</sup>	CV	R <sup>2</sup>	CV	R <sup>2</sup>
D65	1.34	0.999	5.16	0.979	11.07	0.971
A	4.74	0.994	5.69	0.979	5.20	0.992
TL84	4.06	0.988	5.30	0.980	4.97	0.994





TABLE III Summary results for observers mean performance for different light sources

Phase	D65/ High gloss	A/ High gloss	TL84/ High gloss	D65/ Low gloss	A/ Low gloss	TL84/ Low gloss	Mean
Hue	7.05	6.31	7.45	9.31	5.46	7.47	7.18
Lightness	13.91	10.59	10.79	10.94	10.26	11.03	11.25
Colorfulness	29.51	26.56	25.9	28.72	23.83	27.55	27.01



TABLE IV Relationship between model prediction and visual results of low gloss

Color Printing Atlas	Light sources	$CV_v$	$CV_c$	$CV_H$
<u>Y-M</u>	D65	11.35	19.21	6.61
	A	5.93	15.79	6.70
	TL84	9.07	21.44	7.25
<u>M-C-Y50%</u>	D65	14.35	21.80	5.58
	A	13.99	23.64	5.69
	TL84	16.36	39.39	7.15
<u>M-C-Y20%K40%</u>	D65	8.46	24.26	5.80
	A	8.47	25.20	5.29
	TL84	10.13	34.57	7.83





**TABLE V** Relationship between dot area rate and Munsell scale

AM dot area rate	Light sources	M=0%	M=10%	M=30%	M=50%	M=70%
		<b>Y=10% H-gloss</b>	D65	5P-8/2	10P-9/1	10P-8/2
	A	10P-8/1	7.5RP-8/1	2.5RP-8/4	5RP-7/6	5RP-6/8
<b>Y=10% L-gloss</b>	D65	10BP-8/1	2.5RP-8/1	2.5RP-8/4	5RP-7/6	5RP-6/8
	A	2.5RP-9/1	5RP-8/1	2.5RP-8/4	5RP-7/8	5RP-7/10



# Further Work



- 1 Change experiment condition
- 1 Optimizing color appearance model of wide gloss range halftone prints





**Thank You !**

