不同照明条件下中国青年女性
彩色图片的喜爱肤色①

许宗惠　　林仲贤　　孙秀如
（中国科学院心理研究所）

摘　要　本研究采用类例判断法,在不同光源下对 22 张图片肤色样本逐一地进行主观评价。使用的照明光源为 D_{65}、CWF 和 A 三种标准光源,色温分别为 6500K、4150K 和 2856K。垂直照明,45°观察。肤色样本的视角为 2°。实验结果表明:观察者在 A 光源下比 D_{65} 光源更容易地评价肤色样本的质量,即在 D_{65} 光源下的满意样本,在 A 光源下其喜爱程度趋于提高,而对不满意样本的喜爱程度趋于降低或基本相同;在三种照明条件下,被评为最佳肤色的样本与真实肤色有些偏离,色调略为偏黄,亮度较高,饱和度则非常接近;在肤色的波长范围内,亮度较高而饱和度偏低的肤色样本往往是优选样本。

关键词:喜爱肤色　标准光源　主波长　色度坐标　青年女性

1　引言

　　人们对被复现的肤色是依据各自的记忆或印象来评价的。肤色尤其是青年女性肤色是一种颇为敏感的颜色——无论在彩色电视、彩色胶片和彩色印刷等方面复现的肤色只要稍为不尽人意时,就难以被人们接受。复现满意的肤色是彩色复制成功与否的重要指标[1]。只有当复现的肤色符合人们的记忆或印象时,才能受到人们的喜爱。因此,所谓喜爱肤色也就是优选肤色或记忆肤色。

　　物体的颜色在很大程度上决定于照明条件。有些光源会使肤色失真。如在水银灯照射下,无论是真人肤色或图片肤色都会显得发绿,从而引起不良的视觉效果。本实验旨在考察不同照明条件下,人们对彩色图片中中国青年女性喜爱肤色的主观评价,找出黄种人的最佳肤色和优选色,并将其色度点标定在 CIE xy 色度图上。实验结果对改进彩色印刷、舞台照明和商业广告的视觉效果具有一定的实际意义。

2　方法

2.1　样本和条件

　　对肤色进行评价时,人们一般采用真人肤色、图片人像肤色和门色尔色票等作为实验手段[2]。本实验采用的实验样本为图片肤色,为了排除具体人物形象对记忆色的影响。我们在一中性灰纸上开一个直径为 12 毫米的圆形小孔,然后将其复盖在彩色人像图片上,并使圆孔正对人像的脸颊部位。通过对圆孔呈现的肤色逐一进行评价。该小孔的直径为 20mm,等于测色仪器的探头大小。

　　对肤色测定的部位通常多以脸颊部位为代表。本实验采用 302D 型色差计测定了 170 张中国青年女性彩色图片脸颊部位的肤色。然后再根据色度点分布的广泛性、均匀性和代表性,从中选取 22 张图片作为人像面部肤色实验样本进行视觉评价。

　　进行实验时,肤色样本随机地逐一平放在美制 ACS 标准灯箱的底面(灯箱的底面和三个内壁均为中性灰色)。每幅照片的呈现时间约为 30 秒。图片呈现的间隔为 1 分钟。照明条件分别为 D^{65}(朝北的平均日光)、CWF(典型的办公室或商场照明)和 A 光源(普通的家用照明)三种,其色温分

别为 6500K、4150K 和 2856K。被试正坐在灯箱前,脸朝灯箱的开口一面。垂直照明,45°观察。样本视场为 2°。

2.2　被试为 40 名一、二年级大学生(男女各 20 人)具有正常的颜色视觉。

2.3　方法和程序

本研究采用类例判断法,分别在三种光源下对 22 张肤色样本进行主观评价。评分采用国际无线电咨询委员会 500 号建议在五级质量量表,分为"很好"、"好"、"可以"、"差"和"劣"五个等级,并分别定为 5 分、4 分、3 分、2 分和 1 分。被试根据各自的喜爱标准(记忆色),对分别呈现的肤色样本逐一给于一个相应的分数。

正式实验前,主试在暗室里讲述实验的目的和要求,并将肤色样本随机地逐一呈现给被试一次,以便他们适应环境,并对样本刺激有个初步印象,然后开始实验。每个受试者均对呈现的各种样本评估一次。在改变照明条件之前,让观察者休息五、六分钟,以避免视觉疲劳。

3　结果与讨论

下表是 40 名被试三种标准光源下对 22 张肤色样本的喜爱程度进行评定的结果。表中"评定分数"的算法如下:每张肤色样本的满分为 5 分×40＝200 分。分数百分比是该样本的实得总分除以 200,再乘以 100。

从表 1 可见,前面 4 张肤色样本无论在 D_{65}、CWF 和 A 光源下,评定分数均在 80 分以上,可以认为这是被绝大多数人视为满意的样本。这些样本的主波长在 583.4－595.8 毫微米之间。纯度约在 20－30% 之间。Y 值(反射率)都在 43% 以上。在本实验中,这 4 张样本的肤色可以视为青年女性的优选肤色。青年女性的人像彩色图片如能还原出这样的肤色,就能获得较为理想的视觉效果。人们对肤色样本的评价标准往往与自己的喜爱或印象有关。在本实验中 7 号肤色样本的评定分数在 D_{65}、CWF 和 A 光源下,分别为 93%、92% 和 95%。因此我们可将该样本作为中国青年女性人像图片的最佳再现肤色。

纵观表 1,不难发现在女性肤色范围内(主要在黄橙色区),观众对肤色的满意程度并不单纯地取决于某一因素,而是取决于色调、饱和度和亮度间的综合作用。主波长为 590.7 毫微米的 2 号肤色样本(纯度为 25.4%,Y 值为 43.4%)被视为女性人像的优选肤色;主波长为 602.9 毫微米的 20 号样本也颇受人们的青睐。这个样本在 CWF 和 A 光源下,评定分数都在 80 分以上。该肤色样本的特点是饱和度很小(16.5%),Y 值较大(41.3%)。由此可见,即使彩色并不鲜艳的粉红肤色也会博得公众的好评,偏红的色调并不令人反感。在日常生活中青年女性化装时,往往喜欢在白粉打底的脸上抹些红粉,以增添美观。10 号、21 号和 22 号肤色样本的主波长非常接近,都在 596 毫微米左右(只有饱和度和 Y 值有所区别)。但是,它们无论在哪种光源下引起人们的喜爱程度却有很大差别。我们认为在接近真实肤色的波长区域内,饱和度和 Y 值对肤色的评定起着决定性作用。主观评定分数随着饱和度的增加而降低,而随着 Y 值的增加而增加。中国青年女性真实肤色(x＝0.383,y＝0.346)的主波长为 590 毫微米,饱和度为 27.4%,Y 值为 26.3%[3]。从表 1 可见,本实验最佳肤色(7 号样本)比真实肤色要更偏于黄些而白亮些,但是两者的饱和度却很接近。Bartleson[4] 用门色尔色票作为实验样本。他的研究结果表明:记忆肤色比自然肤色亮而黄些,但饱和度要小些。Thomas[5] 的实验结果与我们的观点更为一致,即满意的记忆肤色比自然肤色黄些,但饱和度非常接近。本实验证实的喜爱肤色与真实肤色的关系同国外的其它实验结果颇为一致[6]。总之,我们认为彩色图片的优选肤色在主波长、饱和度和亮度方面均与女性平均真实肤色有所差别。人们喜爱的记忆肤色并不是对真实肤色的"刻板式"还原。肤色调的波长范围从黄绿色区－橙红色区变化。在

这个范围内,优选肤色的饱和度接近或低于真实肤色,而亮度则要高于真实肤色。然而,应该指出,记忆色是人们在日常生活中业已印象化了的颜色。这种经验色是以原物的真实性为基础的,所以偏离真实肤色太远的再现也是不理想的。

表 1. 三种标准光源下彩色图片青年女性喜爱肤色的评价值

图片号	色度坐标		反射率	主波长	纯度	实验结果（分数）		
	x	y	Y	nm	%	D_{65}	CWF	A
7	0.381	0.350	45.4	587.5	28.4	93.0	92.0	95.0
2	0.378	0.342	43.4	590.7	25.4	84.5	85.0	91.0
10	0.374	0.332	43.9	595.8	21.6	84.0	86.0	81.5
9	0.362	0.350	61.5	583.4	23.1	83.5	87.5	91.5
1	0.405	0.360	38.4	588.0	37.4	76.0	76.5	77.0
14	0.395	0.357	40.5	587.3	34.4	74.5	73.0	76.0
20	0.364	0.323	41.3	602.9	16.5	74.0	81.5	84.5
17	0.394	0.329	32.6	601.1	26.2	73.5	68.5	65.0
15	0.358	0.338	44.0	587.9	18.6	71.0	69.0	75.5
5	0.389	0.372	44.3	582.2	36.2	70.5	72.0	79.5
19	0.348	0.311	38.3	670.0	9.1	62.5	64.0	74.5
21	0.389	0.334	27.9	596.6	26.3	60.5	57.0	57.5
12	0.416	0.337	31.9	598.0	34.6	59.5	59.0	48.5
16	0.368	0.312	35.2	629.8	14.6	59.0	63.5	61.5
6	0.390	0.350	33.4	589.1	30.9	56.0	51.5	52.0
18	0.378	0.309	33.1	642.5	16.5	55.5	54.0	55.0
22	0.410	0.341	25.3	596.0	33.7	54.0	47.0	40.5
4	0.400	0.344	28.1	592.9	31.9	53.0	54.0	51.5
11	0.427	0.351	26.1	593.8	40.9	52.0	53.0	53.0
3	0.439	0.361	34.2	592.0	46.7	50.0	49.5	43.5
13	0.361	0.314	18.6	621.0	13.3	22.0	21.0	21.0
8	0.339	0.305	1608	-495.4*	0.98	20.5	21.0	21.0

＊8 号肤色公样品的主波长落在色度图的非光谱轨迹上,其补色波长为 495.4nm

　　影响肤色外貌的一个重要因素是照明条件的变化。从表 1 的评定分数来看,在不同光源照明下,人们对各种肤色样本的喜爱的程度并不相同。D_{65} 和 A 光源在色度学中被推荐为应用最为普遍的标准照明体[7]。D_{65} 光源最接近自然光,所以我们以它为基准,与 A 光源下的肤色评定分数进行比较。我们根据实验分数用虚线将表中数据分为上下两部分。虚线以上为基本满意或较满意样本,而虚线以下为不满意样本。从虚线以上的数据中我们不难发现：如果将 D_{65} 光源下评定分数在 62.5 分以上的各肤色样本放在 A 光源下让观众评分,那么一般来讲,肤色的喜爱程度将趋于提高。这意味着,就肤色来说,在 D_{65} 光源下被认为满意的颜色,在 A 光源下更为理想;如果将 D_{65} 光源下评定分数在 60.5 分以下的各样本同样放置在 A 光源下让观众评分,那么肤色的喜爱程度将趋于降低或变化不大。由此可见,观察者借助于 A 光源要比 D_{65} 光源更容易地评价肤色样本的质量。至于 CWF 光源下的评定分数基本上界于 D_{65} 和 A 光源之间,或接近某一个光源,并没有表现出较强的规律性。我们认为以上差别主要由光源的色温引起的。A、CWF 和 D65 光源的色温分别为 2856K、4150 和 6500K。随着照明光源的色温升高,其色调逐渐由红橙向蓝变化,影响被照样本的色貌。一般来说,满意样本的亮度较高,饱和度较小。这类偏淡的肤色经橙红色调的 A 光源照明后,显得较为红

润,从而消除了略带病态的视觉印象。如2号肤色样本的评定分数从84.5－91分就是这个缘故。就不满意的样本来说,其亮度较低,饱和度通常偏大,色调往往偏红。有的肤色主波长(8号样本)竟落入非光谱色的区域中。这类暗而偏红的肤色(个别样本为红紫色),在A光源照射下,自然就会显得更红,而失去真实性,令人反感。

4　小结

40名观察者按五级质量表,对呈现在三种标准光源下的22张肤色样本分别给于评价。在本实验条件下可以看到:

凡在D_{65}光源下被评估为满意的样本,在A光源下也会令人满意,而且其视觉效果往往更佳;凡在D_{65}光源下被评估为不满意的样本,在A光源下其喜爱程度趋于降低或基本相同。可见观察者在A光源下比D_{65}光源更能容易地评价肤色样本的质量。

在三种标准光源下,被评为最佳肤色($x=0.381,y=0.350$)的主波长587.5毫微米;Y值为45.4％;纯度为28.4％。可见最佳记忆肤色与真实肤色有些偏离;色调略为偏黄,亮度略高,而饱和度方面则与真实肤色很接近。

在肤色波长适合的范围内,对肤色的喜爱程度取决于亮度、饱和度和色调的综合表现,其中亮度和饱和度起着重要作用。亮度高些而饱和度低些的肤色样本视觉效果较佳。

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《普通心理学》(修订版)出版

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ENGLISH ABSTRACTS

A STUDY OF AGE DIFFERENCES OF SELF—CONCEPT IN ADULTHOOD

Xu Shulian, Wu Zhiping, Wu Zhenyun, Sun Changhua

(Institute of Psychology, Chinese Academy of Sciences)

A self—compiled "Self—Concept Questionnaire" (SCQ) was administered to the study of age differences of 604 adults aged 20 to 94, all with junior middle school education and above. 1)The reliability and validity of SCQ were basically up to standard. Based on the results of factor analysis, SCQ was divided into five subscales:a)Self Consciousness(SC); b) Self Perception of Mental Status(MS); c) Self Control and Self Esteem(CN & SE); d) Ego Strength (ES); and e)Self Perception of Capacity (CA). 2) The score of CN & SE increased with age; CA decreased with age, and no obvious difference was found among the age groups in MS scores; the SC score of the middle—age group was higher than that of the two aged groups;and the ES score of middle—age group was higher than that of the young group. It is suggested that middle age is the optimal stage of self—concept development in adulthood, and old age still keeps a relatively intact self. 3) Except for SC, the males' scores in the other 4 subscales were higher than the females'. 4)Besides,the self conceptions of health status affected MS, CN & SE, ES and CA,and the educational level affected SC, ES and CA.

Key words: Self—concept Questionnaire(SCQ), adulthood, age difference.

THE REPERSENTATION AND PROCESSING OF CHINESE TWO—CHARACTER WORDS

Pen Danlin, Din Guosheng

(Psychology Department, Beijing Normal University)

Recent researches on the representation and processing of Chinese two—character words are concluded in aspects such as the context of study, experimental research and theories. Several most popular experimental techniques and relevant findings are introduced and analysed; and two main models are compared. Finally, it is proposed that several questions should be considered in further investigation. Key words: two—characters words, representation, processing.

THE DEVELOPMENT OF JOINT ATTENTION DURING INFANCY

Dong Qi, Zen Qi, Lin Lei, Wang Yanping

(Institute of Developmental Psychology, Beijing Normal University)

The goal of the present study was to explore the developmental course of joint attention during infancy, the possibility of infants' improving their scores for joint attention tests. The developmental joint attention level of 92 infants aged 8 to 11—month—old was assessed by a standardized gaze paradigm. The results indicated:1) From 8 to 11—month—old, the infants' joint attention kept growing. There was a significant change at the age of 9 months. Until 1—year—old, the infants were still at a low level of development of joint attention; 2) The infants could improve their scores for joint attention tests by practising. The degree of improvement was related to the infants' age. The infants at the age of 8 months hardly benefited from the practice, but the infants over 8—month—old could do better to some degree; 3) In general,the female infants outscored the male ones in joint attention tests.

Key words: infant, joint attention, development, learning ,denderdifference.

A STUDY OF PREFEENCES FOR YOUNG CHINESE WOMEN'S SKIN COLORS AS FOUND IN COLOR PRINTS UNDER DIFFERENT ILLUMINATION CONDITIONS

Xu Zonghuei, Lin Zhongxian, Sun Xiuru

(Institute of Psychology, Chinese Academy of Sciences)

The subjective evaluation of 22 samples of skin colors was made by the category—judgment method under three standard light sources of D65, CWF and A with three color temperatures of 6500K, 4150K and 2850K respectively. The visual angle of the sample was 2. The experiment results indicated: 1) Under the light source A, the judgment for the sample's quality was easier to make than that under the light source D 65, i. e. the satisfaction for the preferred samples tended to be on the increase while that for the non—

preferred tended to be on the decrease or remained unchanged. 2) The optimum sample of skin color obtained under these illumination conditions was slightly yellower and of greater luminance than the average real flesh color, but their saturation was almost the same. 3) In the gamut of skin colors, samples with greater luminance and less saturation were the preferred ones.

Key words: preferred skin color, standard light source, dominant wave length, chromaticity coordinates, young woman.

A STUDY OF THE MEASUREMENT OF CRIMINAL PERSONALITY WITH MULTIPLE METHODS

Kong Keqin, *Zhu Chenhai*, *Ma Qianfen*

(Psychology Department, East China Normal University)

This study was based on the measurement of 126 criminals, with three methods: the questionnaire method of YG test, the performance test of Uchida—Kraepelin Test and the projective method of Color Pyramid Test. The result showed that the performance test and the projective test complemented and verified each other, and revealed the characteristics of criminal personality. But the results of the questionnaire test was negative. More measurement methods should be used in studying criminal personality.

Key words: criminal personality, questionnaire method, perfomancetest, projective method.

THE CONTENT FACILITATION EFFECT ON PROPOSITION TESTS

Zhang Qinglin, *Yang Xong*

(Psychology Department, Southwest Normal University)

The selection task is a kind of conditional reasoning. In this research 6 selection tasks were designed, each two containing an abstract proposition and four concrete propositions. We tested 435 college students to investigate their ways of solving the selection tasks and verify the influence of the propositional contents upon reasoning. The result showed that the selection task was very difficult, and the selection task based upon concrete materials had no facilitation effect. The subjects' reasoning exhibited the characteristics of a matching bias.

Key words: selection task, conditional reasoning, propositionvarification.

AN EXPERIMENTAL RESEARCH ON THE COGNITIVE STRATEGIES IN SOLVING

SIMULATED COVARIANCE PROBLEMS

Liu Xia, *Pan Xiaoliang*

(The School of Politics and Administration, Hubei University)

The purpose of this research was to investigate the kinds of cognitive strategies and infomation processing procedures used in solving simulated covariance problems by means of quantitative and qualitative analyses. The results indicated that the strategies could be classified into trial and error, analytic, and intuitive categories respectively. The best strategy belonged to the analytic category. Key words: covariance problem, protocols, coding, the processsvariable, the cognitivestrategy, the information processing flowchart.

NEGOTIATING AND EXCHANGING BEHAVIORS IN ERALY CHILDHOOD — — A STUDY OF

THE STRUCTURE AND DEVELOPMENT OF POSSESSIONAL BEHAVIORS IN CHINESE AND JAPANESES CHILDREN (I)

Toshiya, *Yamamto*

(Faculty of Liberal Arts, Nara Women's University, Nara, Japan)

Zhang Risheng

(Institute of Developmental Psychology, Beijing Normal University)

This research studied two groups of children aged from 1.6 to 2.6 years in Chinese and Japanese nursery schools with the natural observation method. The data were analysed to find out the process and character of children's interactions concerning some resources. Our findings were: 1) When they tried to gain other's possession, both the Chinese and the Japanese children begin to exhibit the negotiation behavior and a kind of 'exchanging' behavior at around 2 years of age. 2) But the 'exchanging' behavior was not the exchanging behavior in the real sense, but belonged to the pre—exchanging behavior. 3) At this age, their negotiating behavior and pre—exchanging behavior were not effective strategies to gain other's possession. 4) Although the negotiation behavior and pre—exchanging behavior of the Chinese children appeared ealier than those of the Japanese, the Japanese children tended to use the negotiating behavior more often than the Chinese.

Key words: development of possessional behavior, negotiation, exchange, cross—cultural study.