

Evaluation of Elements Layout Design of Ink Painting Posters Based on Aesthetics Model

Xiangyu Ma and Chengqi Xue

School of Mechanical Engineering, Southeast University, Nanjing, China

ABSTRACT

Ink and wash painting is a kind of painting, which is composed of water and ink mixed into different shades of ink. Ink and wash painting is regarded as a traditional Chinese painting. Chinese painting has a long history, is a powerful carrier of the Chinese nation's cultural heritage, it reflects the national consciousness and aesthetic taste of the Chinese nation, because of its characteristics in materials, writing, artistic conception and other aspects, it is unique in the field of world art and has its own system. With the return of local consciousness, more and more designers choose to get inspiration from their own culture. The ingenious application of ink and wash elements in modern poster design shows the vast space of the combination of ink and wash elements and graphic design. Line ink is a traditional form of Chinese painting, which combines with graphic design to show the unique national language, and at the same time to show the profound cultural connotation and spiritual heritage of the Chinese nation to the people of the world. In this paper, through the research on the attractiveness of graphic poster design with ink painting as the background, through the aesthetic investigation of the public and the quantitative calculation of beauty, we can get a unified result, aiming to get the key factors that affect the attractiveness of ink painting posters, and provide the quantitative optimization basis for the typesetting form of the combination of ink painting elements and poster design, so as to better integrate the ink painting elements into the poster design. Traditional art into modern design.

Keywords: Interface design, Aesthetic evaluation, Ink painting, Graphic design, Poster

INTRODUCTION

Ink painting is a painting made by mixing water and ink into different shades of ink. It is regarded as the representative of traditional Chinese painting. A complete ink painting creation process includes painting into a work, title and seal.

The composition of ink painting emphasizes the harmony and unity of points, lines and surfaces, which also corresponds to the unity principle of graphic design. The change of ink in water can be divided into five colors, black and white as the main color matching; the strong contrast of color matching conforms to the principle of harmony and contrast in the formal beauty of graphic design; Chinese style often use large area of white space to highlight the traditional, simple temperament. At the same time, the use of

white space will focus on the main expression, which is also in line with the principle of graphic design balance.

To sum up, ink painting and graphic design principles have a lot in common, can be combined with poster design. Previous studies only studied the blank space of ink and wash elements and the aesthetic feeling of words. This paper comprehensively considered the influence of these factors and put forward the hypothesis that the position and size of the main graphic elements and words in the background of ink and wash painting have an important influence on aesthetic feeling.

DESIGN SIGNIFICANT FACTORS AFFECTING THE VISUAL BEAUTY OF INK POSTER

The rule of formal beauty refers to the experience summary and abstract summary of the formal law of beauty in the process of creating the form and beauty. Wenjie Ji pointed out that the highest realm of Chinese ink and wash painting is the application of the rules of formal beauty, such as symmetry and balance, cadence and rhythm, diversity and unity, and associative artistic conception. Balance refers to the distribution of visual weight in a picture, and visual weight refers to the heavier visual perception of an object. Unity refers to continuity. Rhythm is a kind of regular repetition. In the plane composition, basic figures are arranged and combined repeatedly according to equal proportion and distance, or regular sequence is made to produce rhythm. Based on this, this paper selects four kinds of beauty degree: balance, cohesion, unity degree, rhythm value as the research object. Then explore the influence of these visual beauty degree on the ink painting posters.

EXPERIMENTS

Subjects

There are 44 students in a graduate school in Nanjing, including 19 boys and 25 girls, aged between 20 and 24, with normal vision and corrected vision. The subjects had not learned graphic design knowledge or formal painting skills.

Steps

One typical posters are selected with ink painting as the background, whose constituent elements can be clearly distinguished. Any painting elements and words on the poster can be moved and zoomed. The poster is designed into five different styles by scaling and rearranging the constituent elements (a total of 25 pieces) as the evaluation materials. Then make the subjects sort the subjective aesthetics of the posters in a relaxed state, and collected the scale data. At last, Calculate the beauty value of poster type-setting, and analyze the correlation between it and the subjective ranking of subjects.

Table 1. Sample human systems integration test parameters.

	Rank first	Rank second	Rank third	Rank fourth	Rank fifth	Average ranking
Typesetting 1	29	3	8	2	2	1.75
Typesetting 2	6	12	12	12	2	2.82
Typesetting 3	4	22	11	7	0	2.48
Typesetting 4	3	2	3	7	29	4.30
Typesetting 5	2	5	10	16	11	3.66

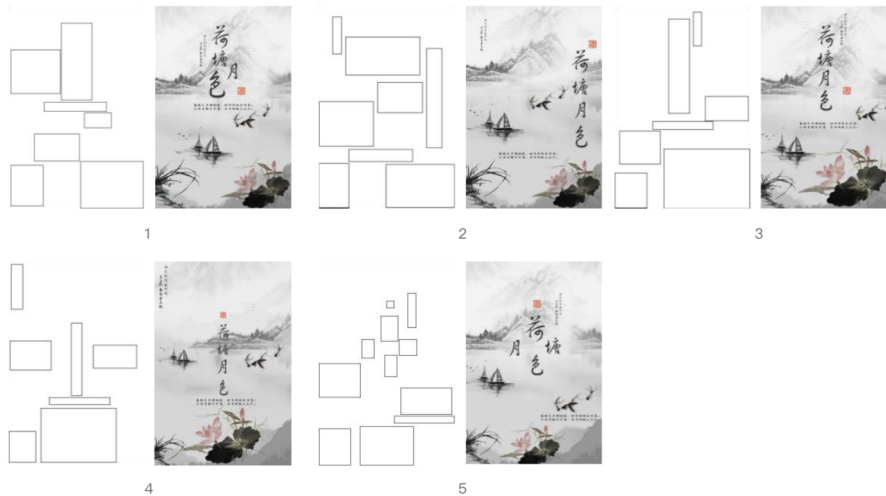


Figure 1: Poster model of “Moonlight in lotus pond”

RESULTS AND DATA PROCESSING

The experimental results recorded the poster types and aesthetic preference of the subjects. The experimental results were statistically analyzed by questionnaire network.

Statistics of Subjects

44 subjects ranked the five posters (as shown in Figure 3–7) from the first (most beautiful) to the fifth (least beautiful) in order of subjective aesthetic degree. The questionnaire is shown in Appendix 1. The order statistics of the posters of Moonlight over the lotus pond are shown in the Table 1. Take the poster “Moonlight in lotus pond” as an example to simplify the poster model. Its prototype and simplified model are shown in Figure 2, and its attribute data is shown in Table 2.

CALCULATION RESULTS AND CONCLUSION OF POSTER VISUAL BEAUTY

According to David Chek Ling NGO, the calculation of balance, symmetry, integrity and rhythm is showed in the picture 2. The degree of balance (BM) represents the difference between the total weight of the components on both

Table 2. Attribute data table of poster model.

Layout (2268*3402)	Object	X	Y	Width	Height
Typesetting 1 (2204*900)	1	46	735	822	738
	2	882	289	518	1290
	3	598	1617	1040	149
	4	1272	1798	446	252
	5	436	2152	752	454
	6	48	2676	530	684
	7	1208	2612	1040	788
Typesetting 2 (2258*3203)	1	222	191	152	616
	2	446	527	1236	636
	3	1794	719	252	1667
	4	794	1295	932	503
	5	2	1615	904	751
	6	498	2414	1064	200
	7	0	2650	503	748
	8	1114	2670	1136	724
Typesetting 3 (2247*3291)	1	902	227	356	1579
	2	1318	103	128	568
	3	1518	1527	712	411
	4	638	1946	1008	128
	5	86	2110	676	544
	6	10	2818	532	576
	7	826	2410	1432	980
Typesetting 4 (2084*3327)	1	57	51	184	756
	2	33	1335	680	487
	3	1049	1039	184	1219
	4	1421	1411	720	383
	5	685	2290	1012	124
	6	17	2866	440	512
	7	541	2470	1260	2122
Typesetting 5 (2240*2863)	1	1121	659	124	112
	2	1473	527	136	568
	3	1025	907	288	424
	4	709	1303	204	308
	5	1329	1299	292	268
	6	1	1699	684	563
	7	1093	1563	200	359
	8	1357	2110	843	436
	9	1248	2582	992	108
	10	1	2790	520	596
	11	684	2758	880	640

sides of the horizontal and vertical axes, Symmetry (EM) shows the difference between the center of the displayed large element and the physical center of the screen, Integrity (UM) is achieved by using similar dimensions while leaving less space between the elements of the screen than at the edges. Integrity (RHM) measures the aggregation degree of screen elements. This paper use matlab program to input four beauty calculations, taking BM as an example,

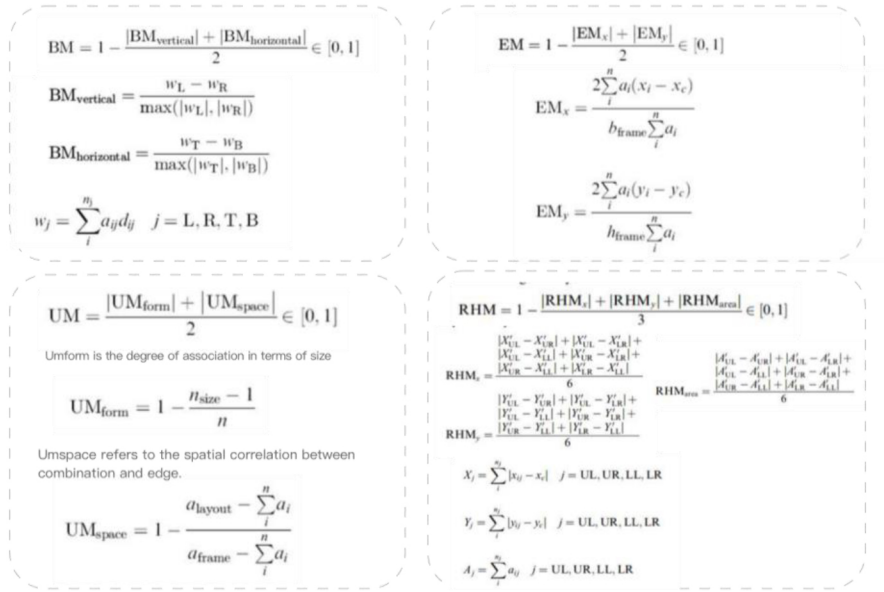


Figure 2: Formula of balance, symmetry, integrity and rhythm.

```

%% BM
for i=1:size(P, 1)
    if P(i, 2)+P(i, 4)<=H/2
        wt=wt+P(i, 3)*P(i, 4)*(H/2-P(i, 2)-P(i, 4))/2;
    elseif P(i, 2)>=H/2
        wb=wb+P(i, 3)*P(i, 4)*(P(i, 2)+1/2*P(i, 4)-H/2);
    elseif P(i, 2)<H/2&&P(i, 2)+P(i, 4)>H/2
        wt=wt+(H/2-P(i, 2))^2*P(i, 3)*(1/2);
        wb=wb+(P(i, 2)+P(i, 4)-H/2)^2*P(i, 3)*(1/2);
    end
end
bmh=(wt-wb)/max(wt, wb);
for i=1:size(P, 1)
    if P(i, 1)+P(i, 3)<=W/2
        wl=w1+P(i, 3)*P(i, 4)*(W/2-P(i, 1)-P(i, 3))/2;
    elseif P(i, 1)>=W/2
        wr=wr+P(i, 3)*P(i, 4)*(P(i, 1)+P(i, 3)-W/2);
    elseif P(i, 1)<W/2&&P(i, 1)+P(i, 3)>W/2
        wl=w1+P(i, 4)*(W/2-P(i, 1))^2/2;
        wr=wr+P(i, 4)*(P(i, 1)+P(i, 3)-W/2)^2/2;
    end
end
bmw=(w1-wr)/max(w1, wr)
BM=1-(abs(bmh)+abs(bmw))/2
    
```

Figure 3: Calculation code of BM.

(P (I, 1), P (I, 2), P (I, 3); P (I, 4) represents x, y, W, h respectively), programming is shown in Figure 3. The data statistics of each poster model are shown in table 2.

The beauty degree calculation results of the poster are shown in table 3.

Finally, use matlab program to calculate the correlation coefficients between the average ranking of each picture and the four beauty values, as shown below, where rank represents the average ranking score of five pictures, taking BM as an example:

Table 3. Calculation results of beauty degree of moonlight in lotus pond.

	A	B	C	D	E
BM	0.3856	0.6438	0.4296	0.4883	0.3680
EM	0.7494	0.9843	0.9866	0.9432	0.9662
UM	2.3202	0.0650	0.0718	0.5328	0.0472
RHM	0.3660	0.4025	0.4421	0.4362	0.3969

```

>> clear
>> BM=[0.3856, 0.6438, 0.4296, 0.4883, 0.3680];
>> rank=[1.75, 2.82, 2.48, 4.30, 3.66];
>> corrcoef(BM,rank)

ans =

    1.0000    0.1165
    0.1165    1.0000

```

Figure 4: The calculation of correlation coefficients.

The correlation coefficients of BM, EM, um, RHM and rank were 0.1165, 0.5685, -0.5705 , 0.5235, respectively. According to the principle: correlation coefficient $0.00 - \pm 0.3$ is micro correlation, $\pm 0.30 - \pm 0.50$ is real correlation, $\pm 0.50 - \pm 0.80$ is significant correlation, $\pm 0.80 - \pm 1.00$ is high correlation, it is concluded that the subjective aesthetic value of the poster is slightly correlated with balance um, and significantly correlated with symmetry em, integrity um and rhythm RHM.

CONCLUSION

Experiments show that symmetry, integrity and rhythm are the most significant factors affecting the beauty of poster layout. In addition to “balance degree”, they all correspond to the application of the law of formal beauty in ink and wash painting. Therefore, in the design of ink theme poster, we should pay attention to the “symmetry rule” in the rule of formal beauty, that is, pay attention to creating a visual center, and coordinate with the layout of the whole poster; reasonably apply the “rhythm rule” to make the layout elements regular, and give the variable typesetting and “unity rule” - use the same proportion of elements, so that the elements are more than the edge. Leave less space and make the elements as external as possible instead of internal. Only in this way can the layout of the whole poster be harmonious and uniform, and change regularly, in line with human aesthetic habits.

REFERENCES

- Chan, C., Akleman, E and Chen, J. (2002, October). Two methods for creating Chinese painting. In 10th Pacific Conference on Computer Graphics and Applications, 2002. Proceedings. (pp. 403–412). IEEE.
- David Chek Ling Ngo, Lian Seng Teo, John G. Byrne. Modelling interface aesthetics [J]. Information Sciences, 2003, 152.

- Lee, J. (1999). Simulating oriental black-ink painting. *IEEE Computer Graphics and Applications*, 19(3), 74–81.
- Miller, L. J. (1972). Experiment in Ink and Poster Paint. *Design*, 73(5), 36–38.
- Qin Wang, Qiming Huang & Chuan Qin. (2012). Application of Chinese Ink Wash Drawing in Product Design. *Physics Procedia (C)*. doi:10.1016/j.phpro.2012.05.258.