Psychological Effects of Cut Chrysanthemums in Dyeing Blue and Natural Colors as Table Decorations on Environmental Impression of Restaurant.

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Summary

Cut chrysanthemums in dyeing blue and natural yellow and pink were decorated on tables to investigate the psychological effects of flowers on environmental impression of a restaurant. Blue-dyed chrysanthemums were effective to improve aesthetic and modern impression of the restaurant. Yellow chrysanthemums were effective on general satisfaction, in particular, feeling naturally, however, less effective aesthetically. Using several colours could lead to excess complexity and ambiguity in flower arrangement. The responses were investigated using a Semantic Differential Method (SDM) and statistical analysis. In comparison to condition of no table decoration, cut chrysanthemums in the three colours improved the psychological ratings of some common adjective pairs such as Beautiful-Ugly, Colourful-Colourless, Refreshing-Wearing, and Interesting-Boring, suggesting that the all flowers could improve the environmental impression for the customers. The SDM does seem to have potential for investigating consumer response to cut flowers.

Additional index words : cut chrysanthemums, colour, Semantic Differential Method (SDM), table decoration, indoor amenity, aesthetics.

Introduction

Nature is appreciated visually at many levels, ranging from entire landscapes for tourism through gardens to decoration in the house (Locasso, 1988; Ulrich, 1979). Cut flowers are used as interior decoration all over the world. They can be obtained easily from florists at a reasonable cost and represent one of the easiest ways of bringing nature indoors. They are also flexible, and a change in the interior landscape can be easily achieved. In restaurants, for instance, cut flowers are often placed on tables to improve the atmosphere and visual effect. Sales of cut flowers are important horticulturally, and the industry depends ultimately on this aesthetic or psychological response. However, there are very little data or research studies about how effective the flowers are in practice and what is the best way to use them.

The aim of this study is to investigate the psychological effects of cut flowers used as table decorations in a restaurant using a Semantic Differential Method (SDM). The SDM is often used to evaluate images (Osgood, 1955) and this research can be seen partly as an exploration of how well this method adapts to assessment of the visual landscape. Since colour has a strong effect on the way we perceive everything around us (Norman and Scott, 1952) and is one of the most important details to determine the character of a place (Jakle, 1987), the study looked at the effects of variation in the colour of flowers. In particular, the floriculture industry is interested in new colours or unusual colour in commercial flower crops because of the potential strong impression they can make. Blue-flowering varieties, for instance, have been of great

Received; 30 May 2001. Accepted; 7 March 2002.

interest, because these shades are missing from a number of important ornamental plants, including carnations, chrysanthemums, and roses (Holton and Cornish, 1995) and it is suggested that they could attract people extensively if they were bred and used as decorations. Therefore, cut chrysanthemums dyed in a blue colour were compared with those in natural yellow and pink colours in the SDM.

Materials and Methods

Dendranthema grandiflorum 'Sunglow' (yellow), 'Clarissa' (pink), and 'Leagan' which were originally white and dyed blue were produced in the Netherlands were obtained from a florist in Reading, England. The shape and size of the flowers were similar and the dyed blue flowers appeared natural other than the colour. The stems of the chrysanthemums were cut to 50 cm-length and had 7-8 capitula. When the flowers in more than 2 colours were used, the capitula and leaves folded each other and the volume was similar to those of the flowers in single colour. The experiment was carried out from the 29th July to 24th August, 1998.

Questionnaire

People who visited Blue Room Restaurant during lunch time were asked to evaluate the environmental image in the dining area by answering a questionnaire based on the SDM (Osgood, 1955). It was important that the respondents were not aware that the flowers were the subject of the study, and they were asked only to consider the general impression of the interior setting for that day. Therefore the subjects evaluated all interior factors, but the only significant changes were the flower decoration. Most of the subjects were students in the twentieth and thirtieth and made up of many nationalities (Table 1). Each survey assessed about 30-40 subjects at one time, except for 3 replications in no table decoration as a control.

The questionnaire consisted of 30 bi-polar adjective pairs (e.g., Beautiful-Ugly) were selected from primary factors, alternative factors and supplementary factors as described in Hershberger and Cass (1988) and Kasmar (1988) and used similarly to the previous research (Adachi et al., 2001). Each adjective pair represented an image factor and was evaluated at one of seven degrees where the left hand adjective was expressed by a degree of one and the right hand adjective by a degree of seven.

A t-test (two-sided test) was carried out for each adjective pair between blue conditions which contained blue flowers (sum of B, B+Y, B+P and B+Y+P) and non-blue conditions without blue flowers (sum of Y, P and Y+P), between yellow conditions (sum of Y, B+Y, Y+P, B+Y+P) and non-yellow conditions (B, P, B+P), between the conditions of single colour (sum of B, Y and P) and those of more than two colours (sum of B+Y, B+P, Y+P and B+Y+P). The t-test was also carried out between the conditions in which flowers were in single colour (sum of B, Y and P) and those in which flowers were in more than two colours (sum of B+Y, B+P, Y+P and B+Y+P).

A one-way ANOVA analysis of each adjective pair and factor analysis were carried out using the SPSS program. In the factor analysis, all of the data were analysed together and then the mean value of factor scores in each condition was calculated. To prevent the subjects from perceiving trends in the questionnaire, positive and negative values were randomly distributed on both left and right sides. However in the calculation of the factor analysis, the right hand adjectives in Cool-Warm, Distracting-Facilitating, Dry-Humid, Musty-Fresh, Rigid-Flexible, Rugged-Delicate, Tense-Relaxed pairs were exchanged with the paired left hand ones in order ensure that all positive adjectives were scaled on the left and all negative ones on the right. Therefore, lower values in factor scores could decrease the evaluated degree in each adjective pair. The one-way ANOVA was carried out between all conditions, B (one stem of blue flower), Y (one stem of yellow flower), P (one stem of pink flower), B+Y (two stems of blue flower and yellow flower), B+P (two stems of blue flower and pink flower), Y+P (two stems of yellow flower and pink flower), B+Y+P (three stems of blue flower, yellow flower and pink flower), and Nod (no table decoration). A three-ways ANOVA in the three colours was carried out for each adjective pair. Considering the 3 colours as 3 factors, the analysis was done with 8 conditions (with Blue or without Blue × with Yellow × without Yellow × with Pink or without Pink;

Tab.1. Numbers of subjects, females and males, and nationalities in each table decoration.

	Table decoration of cut chrysanthemums							
Abbreviations	B	Y	P	B + Y	B + P	Y + P	B + Y + P	Nod
Number of subjects	34	34	32	43	32	33	32	64
Number of females and males	11, 23	18, 16	9, 23	18, 25	13, 19	9, 24	15, 17	33, 30
Number of nationalities	13	9	7	11	10	11	11	15

B, Y, P, B+Y, B+P, Y+P, B+Y+P, and Nod were abbreviations of one stem of blue flower, one stem of yellow flower, one stem of pink flower, two stems of blue flower and yellow flower, two stems of blue flower and pink flower, two stems of yellow flower and pink flower, and three stems of blue flower, yellow flower and pink flower, and no table decoration.

B, P, Y, B+P, B+Y, Y+P, B+Y+P). Excel Statistics 2000 Software for the Windows was used for the calculation.

Results and Discussion

This study showed that the cut chrysanthemum decorations were effective on improvement of environmental impression in the indoor restaurant. In comparison to *Nod*, all of the chrysanthemums as table decorations had significant lower ratings (better evaluations) in some adjective pairs (i.e., Beautiful-Ugly, Bright-Dull, Colourful-Colourless) (Table 2). The adjective pairs generally had significant differences in the one-way ANOVA between all table conditions as well as the t-test (data not shown). Most of the adjective pairs had also high factor loadings in Factor Ⅰ to Factor Ⅶ in the factor analysis between all table conditions (Table 3). The significant adjective pairs in the present t-test were generally common to the previous study in which live and artificial cut roses, cut greens and cut pink chrysanthemums of table decorations were compared to no table decoration by the SDM (Adachi et al., 2001). Therefore, all of the flower table decorations were commonly effective on improvement of the environmental impression in the restaurant. In the factor analysis, there were higher factor scores (worse evaluations) in Factor Ⅰ to Ⅲ than other flower conditions (Table 4), convincing the psychological effects of flowers.

This study also showed the colour of the cut flowers influenced on the psychological ratings in the SDM. Chrysanthemums in dyeing blue colour were shown as more effective than those in natural yellow and pink in providing aesthetic satisfaction such as elegance and modern image to customers in the restaurant, considering that the significant adjective pairs in the t-test between the blue and non-blue conditions (Table 2). In addition, there were significant main effects of blue colour in 'Refreshing-Wearing' and 'Traditional-Contemporary' in the three-ways ANOVA which were related to fresh and modern image effects (Table 5), and lower scores (better evaluations) in Factor Ⅱ 'Elegance' in the factor analysis (Table 4). The blue colour in chrysanthemums is so unusual that people can feel curiosity and evaluated positively. It has been also reported that blue colour was chosen as the most favorite colour by many races (Eysenck, 1941; Pasciak and Williams, 1974; Saito, 1996). The 'Blue-

Tab.2. Comparison of mean scores in colour combination of cut chrysanthemums as table decoration.

Table decoration	Significant adjective	pair p-value	Comparison of mean scores
1. Table flower decorations	1. Beautiful-Ugly	0.000***	Flower decorations < Nod
(B, Y, P, B+Y, B+P, Y+P, and B+Y+P)	2. Bright-Dull	0.001***	Flower decorations < Nod
v.s.	3. Clear-Ambiguous	0.023**	Flower decorations < Nod
No table decoration (Nod)	4. Colourful-Colourless	0.000***	Flower decorations < Nod
	7. Elegant-Plain	0.039*	Flower decorations < Nod
	10. Fashionable-Unfashionable	0.004**	Flower decorations < Nod
	11. Feminine-Masculine	0.002**	Flower decorations < Nod
	17. Interesting-Boring	0.010**	Flower decorations < Nod
	18. Lively-Dull	0.001***	Flower decorations < Nod
	19. Natural-Artificial	0.008**	Flower decorations < Nod
	23. Refreshing-Wearing	0.000***	Flower decorations < Nod
	26. Roomy-Cosy	0.000***	Flower decorations < Nod
	27. Tasteful-Tasteless	0.014**	Flower decorations < Nod
	29. Vibrant-Subdued	0.000***	Flower decorations < Nod
2. Blue condition (B, B+Y, B+P, and B+Y+P)	1. Beautiful-Ugly	0.019**	Blue < Non-Blue
v.s.	6. Delicate-Rugged	0.014**	Blue < Non-Blue
Non-Blue condition (Y, P, and Y+P)	7. Elegant-Plain	0.007***	Blue < Non-Blue
	10. Fashionable-Unfashionable	0.020*	Blue < Non-Blue
	20. Pleasant odour-Unpleasant odour	0.043*	Blue < Non-Blue
	27. Traditional-Contemporary	0.019**	Blue > Non-Blue
3. Yellow condition (Y, B+Y, Y+P, and B+Y+P)	19. Natural-Artificial	0.011**	Yellow < Non-yellow
v.s.			
Non-Yellow condition (B, P and B+P)			
4. Pink condition (P, B+P, Y+P, and B+Y+P)	1. Beautiful-Ugly	0.041*	Pink > Non-Pink
v.s.	4. Colourful- Colourless	0.043*	Pink > Non-Pink
Non-Pink condition (B, Y, and B+Y)	16. Humid-Dry	0.006***	Pink < Non-Pink
	17. Interesting-Boring	0.025**	Pink > Non-Pink
	22. Protect-Exposed	0.043*	Pink > Non-Pink
	25. Romantic-Unromantic	0.010**	Pink > Non-Pink
5. Single colour condition (B, Y, P)	3.Clear-Ambiguous	0.009***	Single < Double
v.s.			
Double and triple colours condition (B+Y, B+P, Y+P, and B+Y+P)			

Adjective pairs whose p-values were under 0.05 were shown. *,** and *** indicate 0.05, 0.025 and 0.01 significant differences, respectively. B, Y, P, B+Y, B+P, Y+P, B+Y+P, and Nod were abbreviations of one stem of blue flower, one stem of yellow flower, one stem of pink flower, two stems of blue flower and yellow flower, two stems of blue flower and pink flower, two stems of yellow flower and pink flower, and three stems of blue flower, yellow flower and pink flower, and no table decoration.

Tab.3. Varimax factor loadings above 0.3 from factor I to factor V by the factor analysis with all the Semantic Differential Method. The eigenvalues were above 1.0.

Adjective pairs	Varimax factor loading				
	Factor I 'Satisfaction'	Factor II 'Elegance'	Factor III 'Brightness'	Factor IV 'Relaxation'	Factor V 'Rigidity'
1. Beautiful-Ugly	.353	.328	.498		
2. Bright-Dull	.322		.689		
3. Clear-Ambiguous			.611		
4. Colourful-Colourless		.355	.577		
5. Complex-Simple					
6. Delicate-Rugged				.666	
7. Elegant-Plain	.354	.624			
8. Exciting-Calm		.523			
9. Facilitating-Distracting					
10. Fashionable-Unfashinable	.366	.694			
11. Feminine-Masculine		.459			
12. Flexible-Rigid	.329				-.437
13. Formal-Casual					
14. Fresh-Musty				.465	
15. Friendly-Unfriendly	.677				
16. Humid-Dry					-.359
17. Interesting-Boring	.677	.323			
18. Lively-Dull	.731				
19. Natural-Artificial	.569				
20. Pleasant odour-Unpleasant odour	.366				.321
21. Pleasing-Annoying	.713				
22. Protect-Exposed	.390				.322
23. Refreshing-Wearing	.592				
24. Relaxed-Tense					
25. Romantic-Unromantic		.597			
26. Roomy-Cosy					
27. Tasteful-Tasteless	.598				
28. Traditional-Contemporary					
29. Vibrant-Subdued	.388	.338			
30. Warm-Cool					-.507
Contribution rate	27.043%	8.328%	5.240%	5.057%	4.553%

Tab.4. Mean values of factor scores from Factor I to V in each condition by a factor analysis with all the Semantic Differential methods data of all conditions.

Factor	Factor I 'Satisfaction'	Factor II 'Elegance'	Factor III 'Brightness'	Factor IV 'Relaxation'	Factor V 'Rigidity'
Condition	Factor score				
B	-0.165	-0.453	-0.112	-0.212	-0.140
Y	-0.161	0.170	-0.391	0.281	-0.259
P	-0.020	0.016	-0.143	0.264	0.102
B+Y	-0.093	-0.179	-0.085	0.057	0.067
B+P	0.100	-0.011	0.212	-0.043	-0.093
Y+P	-0.126	0.177	-0.026	0.061	0.190
B+Y+P	-0.128	-0.121	-0.102	-0.133	0.245
Nod	0.279	0.257	0.329	-0.150	-0.083

B, Y, P, B+Y, B+P, Y+P, B+Y+P, and Nod were abbreviations of one stem of blue flower, one stem of yellow flower, one stem of pink flower, two stems of blue flower and yellow flower, two stems of blue flower and pink flower, two stems of yellow flower and pink flower, and three stems of blue flower, yellow flower and pink flower, and no table decoration.

Tab.5. Significant adjective pair in the Three-ways ANOVA in three colours of cut chrysanthemums.

	Adjective pair	
	23. DRefreshing-Wearing	27. DTraditional-Contemporary
Main effect		
B(Blue)	*	*
Y(Yellow)	n.s.	n.s.
P(Pink)	n.s.	n.s.
Interaction		
B × Y	n.s.	n.s.
B × P	n.s.	n.s.
Y × P	n.s.	n.s.
B × Y× P	n.s.	n.s.

* indicates 0.05 significant difference, respectively.

seven phenomena' in colour preference can perhaps help explain the effectiveness of the blue flowers. Behe et al. (1999) reported that blue colour was chosen as more favorite for customers of florist shops than other colours in corollas of geraniums. However, there was a significant higher score of the blue-flowers in 'Relaxed-Tense' than those of the other colours (data not shown), suggesting that the flowers could arouse tension. This could be because they were unexpected colours for these flowers and not necessary the best colour in flowers. Doyle et al. (1994) reported that dyed blue cut carnation was less favourable than red cut roses when they were decorated indoor.

Yellow colour was also effective on 'Brightness' (Factor III) in the restaurant, considering the lower factor scores in Factor III, however, it was less effective on 'Elegance' (Factor II) in comparison to blue colour (Table 4). The result of t-test between yellow condition and non-yellow condition showed that the yellow colour added natural impression in the restau-

rant (Table 2). The effect of yellow colour on improvement of natural image could also be shown by the results in which there was a tendency that the mean scores in ' Natural-Artificial' increased in blue conditions (p=0.103), while the mean scores were significantly (p=0.008) lower in the blue condition containing yellow (B+Y, B+Y+P) than the blue condition not containing yellow (B, B+P) (data not shown). Talbott et al. (1976) reported that yellow chrysanthemums on tables in a dining room in a hospital were significantly effective on food consumption, vocalization and longer time spent in the room of the hospitalized psychiatric patients.

Pink colour was less preferable than the blue and yellow colours, considering the higher ratings of some adjective pairs in the pink condition than those of non-pink condition (Table 2) and the higher factor score in Factor I 'Satisfaction' than those of blue and yellow (Table 4) . Robertson and Harn (1978) reported that bronze colour was the most popular for floricultural consumers in common to premium, normal, and sale price in potted chrysanthemums. It was suggested that there wers specific preferable and not preferable colours in each flowers. Pink colour could be a not preferable colour as the table decoration.

Adequate complexity is an important factor in environmental preference (Rapoport and Kantor, 1967; Kaplan and Kaplan, 1982). However, excessive complexity can also arouse confusion (Kaplan and Kaplan, 1982; Jakle, 1988). Using more than 2 colours in cut chrysanthemums perhaps leaded the customers to be confused in this study (see in Table 5). There was a significant difference in the mean value of 'Clear-Ambiguous' between single colour and more than 2 colours conditions (Table 2) and a tendency in the mean value of 'Complex-Simple' between them ($p < 0.065$).

These results represent the conditions found in one restaurant and for one set of flowers. Obviously colour interactions can occur not only between flowers but also between the flowers and their setting. The results may therefore not be applicable in all cases. Nevertheless they do illustrate the way in which subtle changes in perception and satisfaction can occur. Much more work needs to be done before the floriculture industry can claim to understand why some flowers are popular, or what they are the best used for, but the SDM does seem to have value as a research tool for these investigations.

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摘　要

テーブル上の切り花がレストランのイメージ評価におよぼす影響Ⅱ：キク切り花の人工染色した青色と自然の花色の影響

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レストランではしばしば切り花が装飾として使用されているが，その花がレストランの利用者にどのような心理的効果を与えるのかについてはほとんど報告されていない。特に，花色の心理的効果については報告がない。本報では，Reading大学内にあるレストランBlue Room Restaurantのテーブル上に異なった花色のキク切り花を装飾し，昼食時の来客に対してSemantic Differential Method(SD法)に基づいて心理的アンケート調査を行い，統計学的に比較した。

全ての切り花装飾は，切り花装飾がないコンディションに比べて総合的なレストランの環境イメージ評価を向上させた。青色に染色したキクでは，レストランの美的(エレガントさ，美しさなど)と斬新なイメージを向上させる効果があり，一般的でない花色の使用による影響が示唆された。黄色のキクは自然感を向上させるのに効果があったが，美的効果は青色に比べてやや劣った。ピンク色のキクは，青色と黄色に比べて総合的評価がやや劣り，この装飾では好まれない花色であると考えられた。2色および3色のキクを生けた装飾では単色の装飾に比べて明確さの項目の評価がやや劣っており，複色の使用によって複雑なイメージが過度に加わった可能性があった。