

# Psychological Ratings of Cut Flowers, Cut Greens, and Artificial Plants as Table Decoration in a University Restaurant

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## Summary

The psychological impact of cut flowers versus artificial plants which were placed on tables in a restaurant is measured by the Semantic Differential Method (SDM). Three hundreds and four patrons serving in the restaurant were given a list of 33 pairs of adjectives, and were asked to rate total impression of the interior scene without information of the table decoration on a scale from one (positive meaning) through seven (negative meaning) degrees. Compared to undecorated tables the presence of both cut flowers and artificial plants yielded significantly better ratings. With respect to some adjective pairs cut flowers received significantly better ratings than artificial plants. Also on some other adjective pairs artificial plants were rated significantly better than cut flowers. Cut flowers were rated better in terms of amenity whereas artificial plants were found more pleasing aesthetically. The results indicate that both cut flowers and artificial plants were rated favorably, and thus contribute to the general image of a restaurant.

**Key Words:** cut flowers, cut greens, artificial plants, psychological effects, Semantic Differential Method (SDM), table decoration, amenity, aesthetics.

## Introduction

People have used artificial plants as well as live plants as symbols and decorations since ancient times (Hagedorn, 1987; Grueber and Evans, 1992). Artificial plants are rather expensive, but can maintain their effectiveness over a long period of time, while cut flowers do not. For industrial production of cut flowers the investigation of differences in the appreciation of artificial and cut flowers can help to emphasize the advantages of cut flowers and artificial plants as table decoration in restaurants. For example, artificial plants can detract from the natural image in a room. The first aim of this study is psychological measurement of effects of cut flowers and imitations of cut flowers, i.e. artificial plants with the Semantic Differential Method (SDM). The SDM has been widely used to evaluate a concept by using some adjective pairs

which can include evaluation, potency, and activity and express the total meaning of it (Osgood and Suci, 1955). In horticulture, landscape and architecture, the SDM has been applied to evaluate psychological effects of plants (Doyle et al., 1994; Kim and Fujii, 1996), landscape scenery and environment (Hershberger and Cass, 1988). In the second, this study also compared the psychological effects of the cut flowers, cut greens, and artificial plants with that of no table decoration. This is the first paper to measure effects of cut and artificial plants as a table decoration by a statistical method.

## Materials and Methods

### 1. Table decoration

The subjects rated 9 different arrangements of table decoration. One stem of cut roses 'Souvenir' were placed in a uniform white vase at the center of the tables in the restaurant at the University of Reading, England on 27

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August 1998. This was referred to red rose decoration (*rrd*). Artificial plants of the cut roses were also similarly decorated on 2 September 1998 (artificial rose decoration; *ard*).

Cut spray chrysanthemums 'Clarissa' (baby pink color) were decorated on 17 August 1998 (pink chrysanthemum decoration; *pcd*). Artificial plants of the cut chrysanthemums

were similarly decorated on 10 August 1998 (artificial chrysanthemum decoration; *acd*).

Branches of *Elaeagnus pungens* planted in front of the library building at the University were cut to 40cm-length and used as cut green decoration (*cgd*). Two branches of the cut greens were placed in each of the vases on the tables on 6 August 1998. Artificial plants of the cut

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

Table decoration	Red rose		Green plants		Red rose and Green plants		Pink chrysanthemum		Sum of 4 plants		No table decoration
	Cut	Artificial	Cut	Artificial	Cut	Artificial	Cut	Artificial	Cut	Artificial	
Subjects	27	29	49	22	22	25	32	34	130	110	64
Males, females	18, 9	15, 14	31, 18	15, 7	8, 14	11, 14	23, 9	16, 18	80, 50	57, 53	33, 30
Nationalities	5	11	20	8	9	14	9	9	24	24	15

Table 2. F-values by one-way ANOVA between all nine table decorations and P-values by t-test (two-sided test) between cut and artificial plants and no table decoration (*nod*) in comparison of mean scores.

Significant adjective pair	One-way ANOVA		t-test	
	All 9 table decorations	Sum of all 4 cut plants v.s. No table decoration	Sum of all 4 artificial plants v.s. No table decoration	Sum of all 8 cut and artificial plants v.s. No table decoration
	F-value	P value (mean scores)	P value (mean scores)	P value (mean scores)
1. Beautiful-Ugly	0.005***	0.004*** (plants < <i>nod</i> )	0.000**** (plants < <i>nod</i> )	0.000**** (plant < <i>nod</i> )
2. Bright-Dull	0.001***	0.002*** (plants < <i>nod</i> )	0.000**** (plants < <i>nod</i> )	0.000**** (plant < <i>nod</i> )
3. Clear-Ambiguous	0.005***	0.005*** (plants < <i>nod</i> )	0.014** (plants < <i>nod</i> )	0.003*** (plant < <i>nod</i> )
4. Colourful-Colourless	0.000****	0.001*** (plants < <i>nod</i> )	0.000**** (plants < <i>nod</i> )	0.000**** (plant < <i>nod</i> )
5. Complex-Simple	n.s.	n.s.	n.s.	n.s.
6. Delicate-Rugged	n.s.	n.s.	n.s.	n.s.
7. Elegant-Plain	0.022*	0.051 (plants < <i>nod</i> )	0.006*** (plants < <i>nod</i> )	0.009*** (plant < <i>nod</i> )
8. Exciting-Calm	n.s.	n.s.	0.048* (plants < <i>nod</i> )	n.s.
9. Facilitating-Distracting	n.s.	n.s.	n.s.	n.s.
10. Fashionable-Unfashionable	0.000****	0.001*** (plants < <i>nod</i> )	0.000**** (plants < <i>nod</i> )	0.000**** (plant < <i>nod</i> )
11. Feminine-Masculine	0.000****	0.001*** (plants < <i>nod</i> )	0.000**** (plants < <i>nod</i> )	0.000**** (plant < <i>nod</i> )
12. Flexible-Rigid	n.s.	n.s.	n.s.	n.s.
13. Formal-Casual	n.s.	n.s.	n.s.	n.s.
14. Fresh-Musty	n.s.	n.s.	n.s.	n.s.
15. Friendly-Unfriendly	0.071	0.019** (plants < <i>nod</i> )	0.013** (plants < <i>nod</i> )	0.008*** (plant < <i>nod</i> )
16. Humid-Dry	n.s.	n.s.	n.s.	n.s.
17. Interesting-Boring	0.004***	0.007*** (plants < <i>nod</i> )	0.001*** (plants < <i>nod</i> )	0.001*** (plant < <i>nod</i> )
18. Lively-Dull	0.001***	0.008*** (plants < <i>nod</i> )	0.000**** (plants < <i>nod</i> )	0.000**** (plant < <i>nod</i> )
19. Natural-Artificial	0.013*	0.002*** (plants < <i>nod</i> )	0.001*** (plants < <i>nod</i> )	0.000**** (plant < <i>nod</i> )
20. Pleasant odour-Unpleasant odour	n.s.	0.048* (plants < <i>nod</i> )	0.031* (plants < <i>nod</i> )	0.024** (plant < <i>nod</i> )
21. Pleasing-Annoying	0.007***	0.002*** (plants < <i>nod</i> )	0.007*** (plants < <i>nod</i> )	0.001*** (plant < <i>nod</i> )
22. Protected-Exposed	n.s.	n.s.	n.s.	n.s.
23. Refreshing-Wearing	0.001***	0.000**** (plants < <i>nod</i> )	0.000**** (plants < <i>nod</i> )	0.000**** (plant < <i>nod</i> )
24. Relaxed-Tense	n.s.	n.s.	n.s.	n.s.
25. Romantic-Unromantic	0.007***	0.009*** (plants < <i>nod</i> )	0.000*** (plants < <i>nod</i> )	0.001*** (plant < <i>nod</i> )
26. Roomy-Cosy	0.011**	0.003*** (plants < <i>nod</i> )	0.035* (plants < <i>nod</i> )	0.003*** (plant < <i>nod</i> )
27. Tasteful-Tasteless	0.043*	0.010*** (plants < <i>nod</i> )	0.000**** (plants < <i>nod</i> )	0.001*** (plant < <i>nod</i> )
28. Traditional-Contemporary	n.s.			
29. Vibrant-Subdued	0.003***	0.000**** (plants < <i>nod</i> )	0.000**** (plants < <i>nod</i> )	0.000**** (plant < <i>nod</i> )
30. Warm-Cool	n.s.	n.s.	n.s.	n.s.
31. Attractive-Unattractive	0.000****	0.000**** (plants < <i>nod</i> )	0.000**** (plants < <i>nod</i> )	0.000**** (plant < <i>nod</i> )
32. Comfortable-Uncomfortable	0.028*	0.001*** (plants < <i>nod</i> )	0.019** (plants < <i>nod</i> )	0.002*** (plant < <i>nod</i> )
33. Deluxe-Shabby	0.015**	0.002*** (plants < <i>nod</i> )	0.003*** (plants < <i>nod</i> )	0.001*** (plant < <i>nod</i> )

Adjective pairs whose F-values and P-values were under 0.10 were shown. \*, \*\*, \*\*\* and \*\*\*\* indicate 0.05, 0.025, 0.01 and 0.001 significant differences, respectively. n.s. indicates not significance.

greens were similarly decorated on 1 September 1998 (artificial green decoration; *agd*).

One stem of *rrd* and one branch of *cgd* were placed in each of the vases and decorated on 28 August 1998 (rose and green condition; *rgd*). One stem of *ard* and one branch of *agd* were similarly decorated on 18 September 1998 (artificial rose and green decoration; *arg*).

Cut flowers and cut greens were so similar in shape and size (i.e., colors, stem length, number of leaves and corollas, opening stage of the corollas) to the artificial plants that they were not distinguishable unless touched or closely observed stems. The imitations were made from cloth in the corollas and leaves and from plastic in the stems.

As a control, surveys were also carried out without any table decoration on 29 July and 3 August 1998 (no table

decoration; *nod*).

## 2. Environment in restaurant

All the surveys were done during lunchtime (11:00 ~ 14:30) when the weather was cloudless. Most of the seats were constantly occupied. The temperature, relative humidity, and light condition were almost constantly 24 °C, 45-60% RH, and 10  $\mu$ E. There were green foliage potted plants constantly present near the entrance and exit of the restaurant, painted landscape scenes on the wall, and window viewing of outside trees and lawn in the all table decoration. Therefore, the indoor environment of the restaurant except for the table decoration was regarded as constant (Ulrich, 1984).

## 3. Questionnaire

People who visited the university restaurant were asked to look around the restaurant and evaluate the impression

**Table 3.** Comparison of mean scores in adjective pairs of Semantic Differential Method between cut and artificial plants as table decorations by t-test (two-sided test).

Table decoration	Adjective pair	p-value	Comparison of mean scores
Red rose: <i>rrd</i> v.s. <i>ard</i>	3. Clear-Ambiguous	0.008***	cut < artificial
	4. Colourful-Colourless	0.081	cut < artificial
	5. Complex-Simple	0.067	cut < artificial
	15. Friendly-Unfriendly	0.086	cut < artificial
	21. Pleasing-Annoying	0.004***	cut < artificial
	29. Warm-Cool	0.015**	cut > artificial
Green plant: <i>cgd</i> v.s. <i>agd</i>	31. Comfortable-Uncomfortable	0.094	cut < artificial
	30. Attractive-Unattractive	0.020**	cut < artificial
Red rose + Green plant: <i>rgd</i> v.s. <i>arg</i>	4. Colourful-Colourless	0.002***	cut > artificial
	10. Fashionable-Unfashionable	0.017**	cut > artificial
	11. Feminine-Masculine	0.015**	cut > artificial
	18. Lively-Dull	0.050*	cut > artificial
	25. Romantic-Unromantic	0.053	cut > artificial
Pink chrysanthemum: <i>pcd</i> v.s. <i>acd</i>	27. Traditional-Casual	0.066	cut > artificial
	4. Colourful-Colourless	0.077	cut > artificial
	7. Elegant-Plain	0.017**	cut > artificial
	10. Fashionable-Unfashionable	0.046*	cut > artificial
	15. Friendly-Unfriendly	0.065	cut > artificial
Sum of all 4 cut plants ( <i>rrd</i> , <i>cgd</i> , <i>rgd</i> , <i>pcd</i> ) v.s. Sum of all 4 artificial plants ( <i>ard</i> , <i>agd</i> , <i>arg</i> , <i>acd</i> )	18. Lively-Dull	0.042*	cut > artificial
	24. Relaxed-Tense	0.043*	cut < artificial
	4. Colourful-Colourless	0.074	cut > artificial
	11. Feminine-Masculine	0.050	cut > artificial
	18. Lively-Dull	0.054	cut > artificial

Adjective pairs whose p-values were under 0.10 were shown. \*,\*\* and \*\*\* indicate 0.05, 0.025 and 0.01 significant differences, respectively.

*rrd*, *ard*, *cgd*, *acd*, *rgd*, *arg*, *pcd*, *acd*, abbreviated for cut red roses, artificial red roses, cut greens, artificial green plants, one stem of cut red roses plus one branch of cut greens, one stem of artificial red roses plus one branch of artificial green plants, pink cut chrysanthemums, and artificial chrysanthemum plants.

of the interior setting by completing a rating sheet based on the SDM (Osgood, 1955; Hershberger and Cass, 1988). Since there was no information about the table decoration, the subjects unconsciously evaluated the total image of the interior setting when a table decoration was added as one of the environmental factors. The subjects were mostly university students and partly the university staffs or visitors. The numbers of the subjects, their nationalities, and males and females were shown in Table 1.

The questionnaire consisted of 33 bi-polar adjective pairs (e.g., "Beautiful-Ugly") selected from primary factors, alternative factors, and supplementary factors as chosen in Hershberger and Cass (1988) and Kasmar (1988) (Table 2). Each adjective pair expressed an environmental image, and was evaluated by a score from one (positive meaning to improve the indoor environment) through seven (negative meaning to do so) degrees.

Therefore, the lower scores in the rating sheets meant better for the evaluation.

The SPSS (Statistical Program of Social Science) was used in t-test (two-sided test), one-way ANOVA in each adjective pair, and factor analysis (Comrey, 1973). The one-way ANOVA was carried out between the all cut and artificial plants or between the all table decorations (Table 2). The t-test was carried out between the all cut plants and *nod* (Table 2), between the all artificial plants and *nod* (Table 2), between the all cut and artificial plants and *nod* (Table 2), between each cut plant and the corresponding artificial plant (Table 3), and between the all cut plants and the all artificial plants (Table 3) in each adjective pair. The factor analysis was carried out between the all adjective pairs except for the pairs "Attractive-Unattractive", "Comfortable-Uncomfortable", and "Deluxe-Shabby", because these three pairs were not used

Table 4. Varimax factor loadings above 0.4 from Factor I to Factor IV in Factor analysis.

Factor meaning	Varimax factor loading			
	Factor I 'Satisfaction'	Factor II 'Sophistication'	Factor III 'Brightness'	Factor IV 'Relaxation'
1. Beautiful-Ugly		.500	.492	
2. Bright-Dull			.640	
3. Clear-Ambiguous			.665	
4. Colourful-Colourless		.455	.508	
5. Complex-Simple				
6. Delicate-Rugged				
7. Elegant-Plain		.669		
8. Exciting-Calm				
9. Facilitating-Distracting				
10. Fashionable-Unfashionable	.490	.504		
11. Feminine-Masculine				
12. Flexible-Rigid				.722
13. Formal-Casual		.524		
14. Fresh-Musty				
15. Friendly-Unfriendly	.583			
16. Humid-Dry				
17. Interesting-Boring	.736			
18. Lively-Dull	.689			
19. Natural-Artificial	.475			
20. Pleasant odor-Unpleasant odor	.517			
21. Pleasing-Annoying	.674			
22. Protected-Exposed				
23. Refreshing-Wearing	.673			
24. Relaxed-Tense				.454
25. Romantic-Unromantic	.463	.495		
26. Roomy-Cosy				
27. Tasteful-Tasteless		.478		
28. Traditional-Contemporary				
29. Vibrant-Subdued	.456			
30. Warm-Cool				
% variance	24.5	8.59	5.97	4.98

in *pcd* and *acd*.

## Results

### 1. Cut and artificial plants vs. no table decoration

There were significantly lower mean scores for each cut and artificial plants than for *nod* in most of the adjective pairs except in the case of "Roomy-Cosy", the mean scores of which in each cut and artificial plants was higher than that in *nod* (data not shown). Most of the mean scores were lower in the all cut plants (*rrd*, *cgd*, *pcd*, and *rgd*), the all artificial plants (*ard*, *agd*, *acd*, and *arg*), and the all cut and artificial plants than those of *nod*, and the significant adjective pairs were consistent with those of the one-way ANOVA between all table decorations (Table 2). There was only one significant adjective pair 'Colourful-Colourless' in the one-way ANOVA between the all cut and artificial plants (data not shown). In the factor analysis, factor loadings were high in "Interesting-Boring", "Lively-Dull", "Pleasing-Annoying", "Refreshing-Wearing", and "Friendly-Unfriendly" in Factor I; "Elegant-Plain", "Formal-Casual", "Fashionable-Unfashionable", and "Beautiful-Ugly" in Factor II; "Clear-Ambiguous", "Bright-Dull", and "Colourful-Colourless" in Factor III; and "Flexible-Rigid" and "Relaxed-Tense" in Factor IV (Table 4). Therefore, Factor I, Factor II, Factor III, and Factor IV were regarded as referring to 'Satisfaction', 'Sophistication', 'Brightness' and 'Relaxation' factors, respectively (Table 4). The adjective pairs whose factor loadings were high showed significant differences in the t-test and one-way ANOVA in general (Tables 2,3 and 4), and these are considered to be important adjective pairs in the evaluation of the psychological effects of table decoration.

### 2. Cut plant vs. artificial plants

The cut plants showed lower mean scores than the corresponding artificial plants in "Pleasing-Annoying", "Clear-Ambiguous", "Attractive-Unattractive", "Complex-Simple", and "Comfortable-Uncomfortable", "Friendly-Unfriendly" in *rrd* than *ard*, "Attractive-Unattractive" in *cgd* than *agd* and "Relaxed-Tense" in *pcd* than *acd* (Table 3). The cut plants showed higher mean scores than the corresponding artificial plants in "Warm-Cool" in *rrd* than *ard*, in "Elegant-Plant" in *pcd* than *acd*, and in "Romantic-Unromantic" and "Traditional-Casual" in *rgd* than *arg* (Table 3). Artificial plants showed lower mean scores than cut plants in "Colourful-Colourless", "Lively-Dull", and "Feminine-Masculine" (Table 3). The mean scores in artificial plants in "Colourful-Colourless", "Fashionable-Unfashionable" and "Lively-Dull" were

lower than the corresponding cut plants except that the mean scores were higher in *ard* than *rrd* (Table 3). There were no extreme differences between cut and artificial plants in factor scores in the factor analysis (data not shown).

## Discussion

Both cut and artificial plants were significantly effective as table decoration to improve the impression of interior scenery of restaurant (Table 2). Many previous reports have shown that watching slides and pictures of natural scenes as well as real natural settings were similarly effective to induce psychological changes in people (Hershberger and Cass, 1988). In particular, this study showed that elaborate artificial plants could be frequently taken for cut plants and be substituted for cut plants used as a table decoration.

This study also indicated that there were some differences in psychological effectiveness between cut and artificial plants even if the visual effects were similar. The aesthetic image more strongly impressed people exposed to artificial plants. A common tendency of significant lower mean scores was shown in the artificial plants in "Fashionable-Unfashionable" and "Colourful-Colourless" except in the case of *rrd* (Table 3). The artificial plants were expensive and of high-quality, so their aesthetic value might be higher than that of the cut plants, which could be injured and physiologically change during vase life. If lower quality artificial plants (i.e. cheaper cut plants made from only plastic) were used, the aesthetic values might well have decreased. Effects of the quality of artificial plants on decorative values should be researched further.

On the other hand, this study indicated that a more comfortable image, relative to pleasantness and relaxation, was perceived when people looked at cut plants. A tendency of significantly lower mean values in the cut plant conditions as compared with those of the artificial plants was shown in "Clear-Ambiguous", "Pleasing-Annoying", "Comfortable-Uncomfortable", and "Relaxed-Tense" (Table 3). Wilson defined 'biophilia' as "the urge to affiliate with other forms of life" (Wilson, 1984). Companion animals are a good example of the biophilia phenomenon (Katcher and Beck, 1983). People can feel contact with both cut and rooted plants as a living form, being psychologically comforted and relaxed when they garden, nurture, or appreciate the live plants both indoors and outdoors. Notably, cut and rooted plants or dried plants have generally been used in horticultural therapy

(Hagedorn, 1987). Recent research has investigated the healing effects of live plants (Coleman and Mattson, 1995; Lohr et al., 1996). Artificial plants can be aesthetically effective, however, they may be inadequate in terms of biophilial companionability or a therapeutic and healing tool because people cannot feel comfort and relaxed with artificial plants so as cut plants.

In this study, cut roses had the best scores in many of the adjective pairs and were regarded as the most effective in terms of both aesthetics and amenity (Table 3). The fact that cut red roses are one of the most expensive cut flowers and are associated with romance and class may explain why they are most effective both aesthetically and in terms of amenity.

In conclusion, this study showed that the decorative effects of artificial plants were approximately similar to those of cut plants, though the aesthetic image of artificial plants made a stronger impression on people, while a more comfortable image in terms of pleasantness and relaxation was perceived when people were exposed to cut plants.

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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：生花と造花の比較

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レストランではしばしば切り花の生花および造花がテーブル上の装飾に使用されている。しかし、その美的心理的效果について比較した学術的報告はほとんどない。本報では、生花とその模造品の切り花をレストランのテーブル上に装飾し、昼食時の来客に対してSD法に基づく7段階評価のアンケート調査を行って統計的に比較した。

美的効果を示すいくつかの形容詞のスコア（色彩豊かである、ファッション性があるなど）は、生花より造花で有意に小さかった。一方、心地よさを示すいくつかの形容詞のスコア（快適である、リラックスしているなど）は、生花のほうがスコアが小さかった。装飾花がある場合とない場合を比較すると、多くの形容詞のスコアは装飾花がある場合に小さかった。

これらの結果から、生花と造花はともに室内環境イメージを総合的に改善する効果があるが、造花は美的効果をあげるのにより効果があり、生花は心地よさを向上させるのにより効果があることが示唆された。