



The emotional influence of flowers on social perception and memory: An exploratory study



J. Mojet^{a,*}, E.P. Köster^b, N.T.E. Holthuysen^a, R.J.F.M. Van Veggel^a, R.A. De Wijk^a, H.E. Schepers^a, F. Vermeer^c

^a Wageningen University and Research Centre, Food & Biobased Research, Consumer Science and Intelligent Systems, Bornse Weiland 9, 6708WG Wageningen, The Netherlands

^b Helmholtz Institute, Psychological Laboratory, Heidelberglaan 1, 3584CS Utrecht, The Netherlands

^c FloraHolland, Middel Broekweg 29, 2675 KB Honselersdijk, The Netherlands

ARTICLE INFO

Article history:

Received 8 November 2015

Received in revised form 5 June 2016

Accepted 14 June 2016

Available online 15 June 2016

Keywords:

Emotive projection test

People's perception of others

Incidental memory

ABSTRACT

Background: Flowers are reported to have immediate and long-term effects on health and well-being, emotional reactions, mood, social behaviour and memory, but emotional effects have rarely been studied in more detail.

Methods: This study investigated the influences of flowers on emotional perception of others in healthy adults (n = 64), divided over 4 conditions (3 flower arrays and a flowerless control). The test included a projection test judging pictures of people. One week later memory regarding pictures in the projection test, roommates and the room they had been in, was tested.

Results: Flowers, positively affected peoples' mood and their perception of others. With flowers, pictures of other people were judged more positively and less negatively than without flowers. Odorous flowers had a more negative effect. The people in the pictures seemed a bit more open, but clearly less friendly, more arrogant and more depressed under its influence. Furthermore, flowers had a positive influence on the remembrance of the room the participants had been in.

Conclusion: Flowers exert a more positive influence by their visual appearance than by their odour, and act more on people's feelings towards unknown others than on liking of the food they eat, whereas flowers have little impact on remembering eating situation aspects.

Practical implication: The use of flowers might perhaps be recommended for increasing relaxation and mutual understanding in public places (restaurants (non-odorous flowers), meeting rooms and waiting rooms).

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1. Introduction

Flowers are supposed to play an important role in our lives. As indicated by Haviland-Jones, Rosario, Wilson, and McGuire (2005), people have cultivated flowers for more than 5000 years without any other reward than the pleasant feelings conveyed by them. To this day these authors seem to have been the only ones who performed systematic experiments about the role of flowers on emotion. In three studies they showed that flowers always illicit the true Duchene smile in women, elicited more positive social behaviour than other stimuli in both men and women and elicited positive mood reports and improved episodic memory in people of an advanced age. Flowers were shown to have immediate and

long-term effects on emotional reactions, mood, social behaviour and memory in both males and females. Flowers also have been reported to have positive effects on the recovery of hospital patients (Park & Mattson, 2008; Ulrich, 1999, 2001, 2002).

To our knowledge, before 2001 there was very little academic research that investigated the psychological effects of cut flowers (Adachi, Rohde, & Kendle, 2000; Matsuo, 1992; Shoemaker, Relf, & Bryan, 1992). In the last one, subjects were shown a video that introduced the University of Reading and included scenes of landscapes. It was shown that a floral display had positive effects on human emotions, such as composedness and confidence. However, some evidence of a significant increase in annoyance was also found for this treatment. A more direct effect of flowers on interpersonal relationship was described by Guéguen in 2011, who showed that women who were exposed to flowers while watching a video of a man perceived the man to be more attractive and sexier and were more inclined to accept a date with this man. Furthermore, in a second experiment women who were exposed to

Abbreviations: EPT, Emotive Projection Test; EBR, Eating Behaviour Registration; GLM, General Linear Model; PCA, Principal Component Analysis.

* Corresponding author.

E-mail address: jos.mojet@gmail.com (J. Mojet).

flowers responded more favourably to an explicit solicitation from a male confederate in a subsequent interaction. These results show that the simple exposure to flowers had a significant effect on women's perception of mating attractiveness and behaviour. Whether men are also positively influenced by flowers in their reactions to and perception of others has not been demonstrated so far.

Studies on mild emotional effects of environmental factors on different aspects of eating behaviour such as speed or amount of eating are rare. It has been shown that mild emotions, in contrast to strong ones where eating is often used to alleviate distress, tend to modulate eating in congruence with the emotion features, i.e. sadness tends to decrease, and joy tends to increase food intake (Macht, 2008; Willner & Healy, 1994). Based on the fact that flowers in general seem to elicit mild joyful reactions, it might be expected that their presence would induce an increase in consumption and perhaps also in the speed of eating. This speed might also be influenced more indirectly via the improved social contact created by the flowers and the resulting amount of conversation. Whether the positive effect of flowers would also be true for smelling flowers, whose odours might interfere with the food odours, remains questionable. On the other hand it is known that odours are strong evokers of emotional autobiographical memories (Chu & Downes, 2000, 2002; Herz & Cupchik, 1995; Proust, 1922; Willander & Larsson, 2006, 2007, 2008), and also can play a role in the memory for other material (Schab, 1990; Zucco, Aiello, Turuani, & Köster, 2012). Whether this is also true for emotion eliciting flowers might also be considered. Thus, it was decided to explore the effects of flowers on memory for different aspects of the lunch situation as well.

At the same time and in order to ensure that the results had maximal ecological validity, (i.e. represented effects as they occur in normal life situations), stress was laid on the use of implicit methods during the exposure of the participants to the flowers (no attention drawn to them) and the lunch (normal eating in the company of others). Furthermore, all reference to possible later memory tests was carefully avoided.

1.1. The present study

In the present exploratory study the implicit emotional effects of flowers on social perception, behaviour and memory are investigated with a variety of methods in a number of realistic restaurant type flower settings, while varying the placement and the odorous quality of the flowers. In order to study the implicit emotional reactions of the participants to the situation, they were invited to take part in the development of a test in which faces had to be described. Furthermore, they were told that since the experiment had to take place during lunch time in view of other experiments in the same rooms, we would provide a free lunch before the experiments started. Thus, they could familiarise themselves in an implicit way with the test room (one out of four), with the presence or absence of flowers, with their fellow participants, with their test room leader, and with the fixed lunch. During the lunch the participants sat together (two by two) and could speak freely with each other. Then afterwards they completed the psychological test (judging the character traits of people in photographs) in silence at separate tables. A week later they came back and were questioned explicitly on their memory of different aspects of the previous session while sitting separately in sensory laboratory booths. Although some questions and measurements in this second week were directed at the influence of flowers on the memory for the food and on the influence of flowers on eating behaviour, this was not the main focus of the experiment. The emotional effects of flowers on the social perception of the people in the photographs of the test and on the memory of the other

participants and of the eating situation was the main purpose of the experiment.

Therefore, in the first week the present empirical study included:

- I. Camera recordings to reveal the influence of the presence of flowers on eating behaviour (e.g. speed of eating and amount eaten).
- II. Emotive projection as an implicit method to investigate the mood effects evoked by the flowers as expressed in the projected psychological character traits ascribed to unfamiliar people shown on photographs.

And in the second week:

- III. Recognition tests to establish the implicit impact of flowers on the unintentionally acquired memory for situational aspects of the session of the week before (e.g. projection test photographs, roommates, meal components).

2. Material and methods

2.1. Participants

Sixty-four participants [19 men (mean age 44.4 yrs \pm 14.9) and 45 women (mean age 44.0 yrs \pm 14.8)] were recruited via the institute's database of registered users according to the following criteria: age range 20–65; around 30% male and 70% female, no food allergy, not on a prescribed diet, raised in The Netherlands and in good command of the Dutch language and, no smell impairment, and no participation in any a previous or concurrent memory study.

As described in the introduction the participants had been invited to participate in an experiment assessing photographs of different faces, and in several other tests taking place in the institute's "Restaurant of the Future" in Wageningen. The memory tests in the second week that were focused on the recognition of the first week experiences were not explicitly mentioned since it is impossible to test memory implicitly when attention is drawn to it beforehand. Candidate participants were informed about the regular use of cameras for research purposes in this building and they were free to withdraw from participation at any time. All subjects signed an informed consent form to participate in the study. Two participants withdrew after the first session. All participants received a free lunch the first day and a small fee together with a voucher for a free lunch in the Restaurant of the Future at the end of the second day. At the completion of the study they received a small fee for taking part in the study and they were debriefed about the objective of the experiment. The study protocol was approved by the Ethics Committee of Wageningen University. Detailed procedures per test are described below (Table 1).

2.2. Flowers

Room 1 was free of flowers. Room 2 contained three similar bouquets of non-odorous flowers in three vases placed alongside one wall of the room. Room 3 and 4 both contained the same odorous flowers, but the placement differed. While in room 3 the placement was the same as in room 2, in room 4 four small bouquets were placed on the four individual tables. The flowers used in room 2 were *Alstroemeria*, *Antirrhinum*, *Celosia*, *Cymbidium*, *Delphinium*, *Eustoma*, *Gerbera*, *Gladiolus*, *Helianthus*, *Protea*, and *Rosa*. In room 3 and 4 *Alchemilla mollis*, *Chrysanthemum*, *Dianthus*, *Freesia*, *Gloriosa rothschildiana*, *Phlox paniculata*, *Rosa*, and *Veronica* were used. All bouquets consisted of mixed flowers to avoid dominant colours and shapes. Every two days of testing

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