

# Success and Failure of Odor Classification as Applied to Reactions to Erogenous Odors

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**Synopsis**—One of the problems of successful perfuming is the difficulty of obtaining from consumers an indication of their ideas about the ideal fragrance, appropriate to the product under consideration. An interviewing method is described which reliably defines the consumer's ideal of the desired perfume type. This method (semantic differential) is illustrated with a description of the concept of an "erogenous fragrance."

Several single odorants, at different concentrations, and some well-known perfumes are included in the test. The data are analyzed by factor analysis to determine which of the materials comes closest to meeting the expectation of the ideal. The Henning and the Crocker-Henderson methods, traditional systems of odor classification, are evaluated and shown to be less suited for the determination of odor qualities.

## INTRODUCTION

Early this year, it was reported that work is in progress in India and England on a perfume which is to serve as an adjunct to birth control measures (1). This perfume, when used by Indian women, is supposed to have the same kind of effect on Indian men as a repellent has on mosquitoes: it is, therefore, an antierogenous perfume. When he smells it, "Romeo no longer longs for Juliet," according to B. L. Raina, Director of the Indian Institute of Family Planning. On the other hand the concern of the perfumers in the Western world has been the

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creation of fragrances which will make Romeo long for Juliet. In this paper the results of an investigation of the psychology of erogenous fragrances will be presented.

Consider, for example, the case of a manufacturer who is trying to attain broad public acceptance for a line of cosmetics. He is searching for an erogenous fragrance. This fragrance should give the woman who uses products with this fragrance the conviction that she is irresistible.

With the help of his marketing research department or an outside consultant organization, the manufacturer will be able to determine the most appropriate advertising theme, the most enticing package and the most effective merchandising approach. He can also find out whether, for example, a product in powder form or a liquid would be more convincing. Modern interviewing techniques can assess the feelings of potential customers in questions of this kind quite accurately. However, up till now the cosmetics manufacturer has had no way of getting a description of the most important thing in this case: the most effective fragrance for his product.

The reason why market researchers find it so difficult to establish the character or message of a perfume is the lack of words to describe this message. It is easy for a respondent to state in an interview that there should be a little less blue in a shade of violet which is meant to harmonize with an erogenous product. But how could he describe how a perfume should be changed in order to meet his expectations? Experienced market research specialists indicate that they know of no reliable method to determine either the impressions and feelings evoked by a fragrance or the consumer's image of the ideal fragrance for a given product.

As a result of the difficulty in finding out what the consumer wants, rather haphazard methods are still being used in fragrance selection. Instead of asking potential purchasers what the odor of cosmetic products should be like, the procedure often consists in selecting among the many available perfume oils a few that are considered appropriate. Next, a few people with responsible positions in the company (or their wives) decide which of these the public will like best.

This method is unsatisfactory, since too many purely accidental factors are involved. In order to find a better approach a research program on the psychology of odor was started in these laboratories several years ago (2, 3). Lately, the specific aim in these laboratories has been the search for a reliable classification of odor characters and for an exact way of expressing similarity or differences between odors. If one looks for an odor which comes as close as possible to an ideal image, one has to

be able first to get a good description of the image and then to determine how closely actual odors approximate this ideal.

Several existing odor classification systems, including those of H. Henning (4) and of E. Crocker (5) were examined. Both of these classification systems offer the possibility of determining the degree of similarity between different odors by describing each as a composite of several so-called primary odors. Crocker offers materials which can be smelled as his primaries; Henning only gives six verbal descriptions. His odor prism, constructed from these descriptions, is shown in Fig. 1.

It was found that certain odors can be reliably described within the systems, while for others it appears impossible to get any close agreement

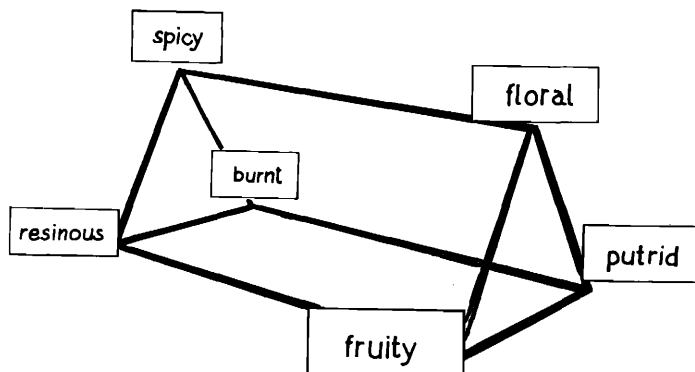


Figure 1. Henning's odor prism

between descriptions (in terms of primaries) by different subjects. Moreover, the primary odors of Henning or Crocker appear to be selected at random and give no clues regarding the psychological or emotional effect of odors.

#### METHODOLOGY AND DISCUSSION

Before an attempt is made to describe an erogenous fragrance one point should be stated clearly: An erogenous fragrance is not comparable to an aphrodisiac with purely physiological action. Instead, an erogenous fragrance is primarily related to emotions and to mental images which may be evoked by olfactory stimuli.

The odor of a perfume or some other odor might certainly strike one as erogenous. Certain perfume materials, such as musk or amber, are said to have a distinct effect of this type. Actually, perfumers have several other materials in their palette which fall into this class.

The description of some perfume materials as erogenous does not mean that these materials by themselves elicit the desired response. As will be shown further on, they do this only in combination with other odorants.

Neither Henning's nor Crocker's classification system can be used to find or describe an erogenous fragrance or to compare it with similar

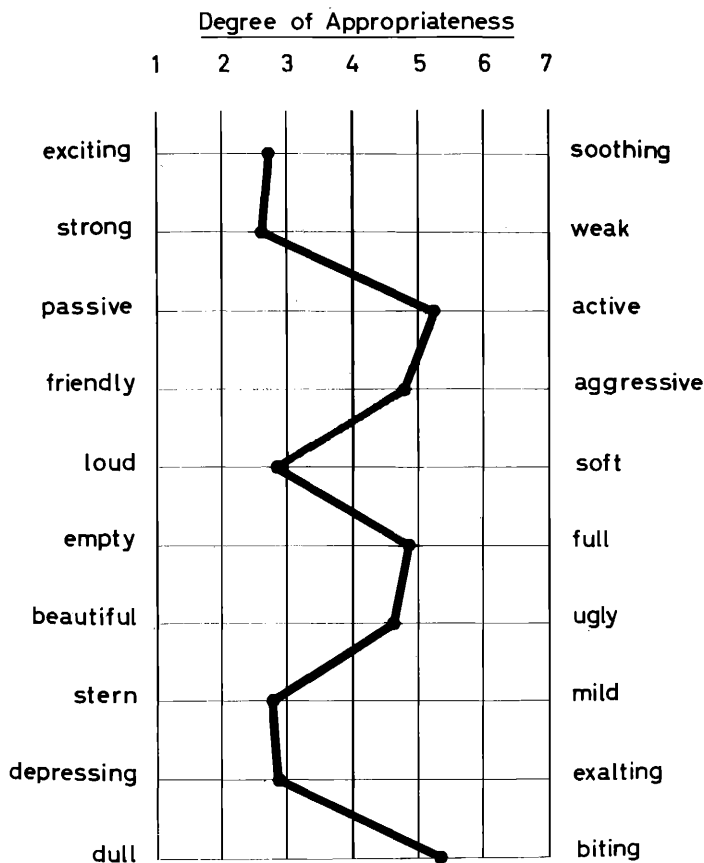


Figure 2. Partial profile of amber

fragrances. In collaboration with Prof. K. Eyferth of the psychology department of the University of Hamburg and Dr. R. Randbrock, Hamburg, a method of classifying fragrances which does meet these demands was developed. This approach is based on the "polarity profile" method of Hofstatter (6) (which corresponds to the "semantic dif-

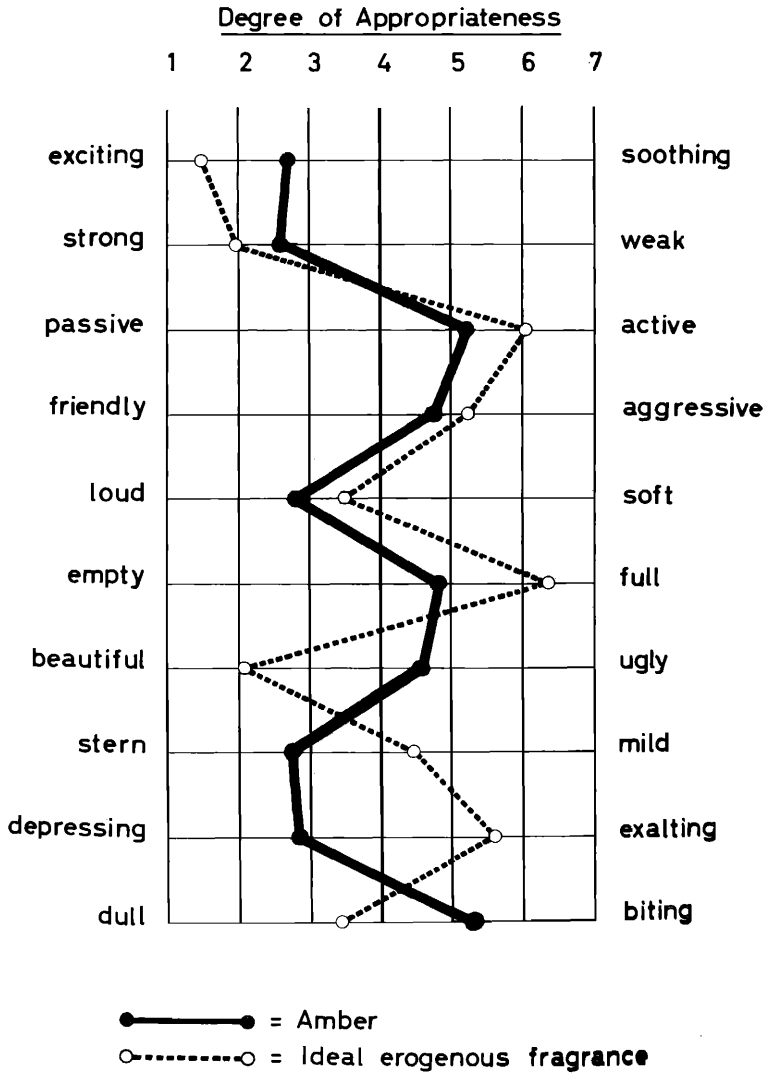


Figure 3. Partial profiles of amber and of "the ideal erogenous fragrance"

ferential" method described by Osgood (7) adapted to the specific demands of odor description). It was first employed in the study reported by the author in Munich in 1960 (3).

The heart of this procedure is a list of 29 pairs of adjectives; the two members of each pair are opposite in meaning.\* Thirty judges were

\* This list was obtained from an original list of 40 word pairs by eliminating those which, by use of the statistical "t-test," were found not to distinguish significantly between different odors.

asked to describe the odor of amber in terms of this list. Thus for the first word pair they expressed their opinion that amber is more exciting than soothing, in the seventh they found it more ugly than beautiful and so on down the line with all the other word pairs. Figure 2 shows the average of the 30 judgments on each word pair. The profile which is obtained in this way is typical for amber. It is, moreover, reproducible. The correlation between profiles obtained for amber at

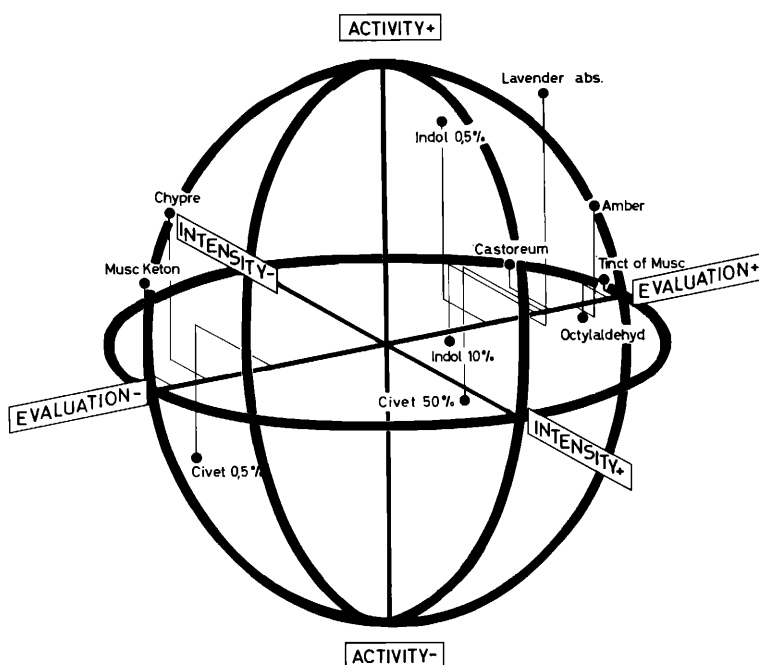


Figure 4. Odor description space with 11 "erogenous" odors

different occasions and by different judges lies between  $+0.87$  and  $+0.94$ ; the statistician knows that this is excellent.

One of the advantages of this method is that it can be used also to get a picture of concepts or mental images which have no physical reality. Thus 30 persons, who had first been asked about amber, were asked to imagine that fragrance which would most closely approximate their idea of erogenous and to describe it using the semantic differential.

The resulting profile has been partially reproduced in Fig. 3; clearly it is very sharp and characteristic. It now becomes possible to compare the profile of amber or of any other fragrance with this "ideal" profile.

The objective can now be expressed as the task of finding that fragrance the profile of which most closely approximates the ideal profile for an erogenous perfume.

When comparing two profiles, the correlation can be calculated to give an exact measure of the similarity of the two odors or of the similarity between a perceived odor and a mental odor-image. Using statistical methods and with a sufficient number of odor profiles Thurstone's (8) factor analysis can be applied. This analysis indicates how

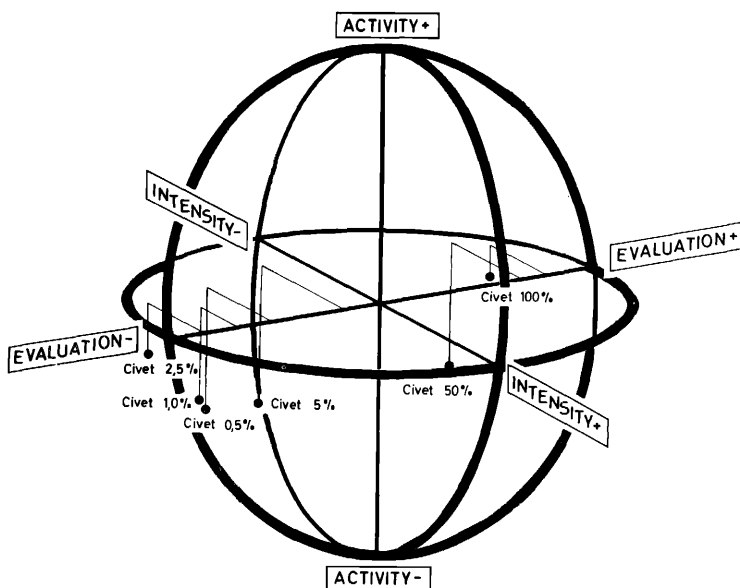


Figure 5. Position of different concentrations of Civet in odor description space

many mutually independent "dimensions" of odor description were distinguished by the judges. When 83 profiles of single aromatics, essential oils and perfume compounds were analyzed in this way it was found that all odor descriptions could essentially be reduced to three dimensions.

Translation of the obtained odor profiles into these three dimensions yields a means of describing findings in a simple picture. An *odor description space* can be constructed, the coordinate axes of which are the three odor dimensions derived from the factor analysis of odor profiles (Fig. 4). The first of these dimensions might be described as *evaluation*: it is a measure of how much the judges like the odor and to what extent

they find it "beautiful" or "harmonious." The second dimension is an expression of the *activity* of the odor and includes judgments on spiciness, alertness and strength. The third has to do with *intensity* of the odor; freshness, hardness and aggressiveness ratings are found in this dimension.

Any given odor (the profile of which has been determined) can be indicated by a point in this odor space. This yields a method of comparing odors (or comparing actually perceived odors and "odor-images") which is more meaningful than the correlation coefficient of odor profiles: Their position in the odor space can be compared, and the distance between them in this space can be calculated. In Fig. 4 is shown the position in the odor space of 11 odors which are generally considered erogenous by perfumers. The location of each point was calculated from polarity profiles (semantic differentials) obtained from thirty judges. It can be seen that these 11 odors do not have very much in common. They are distributed over the entire odor description space. It will be noticed, for instance, that Tincture of Musk (5%) is judged nearly exclusively in the evaluative dimension; it is characterized by high ratings on "disharmonious," "unpleasant," "ugly," "stale." By contrast, Lavender absolute (1%), with high ratings on "happy," "fresh," "young," "interesting," "spicy" and "bright," scores primarily in the second dimension, activity. Civet was first smelled in two widely different concentrations, 0.25 and 50%, and it is notable that the position of Civet in the odor space changes drastically with concentration. This made it desirable to run further tests to obtain the profiles of Civet at four additional concentration levels, and in the end values for different concentrations of Civet (0.5, 1.0, 2.5, 5.0, 50, and 100%) were entered in the diagram (Fig. 5).

The six points for Civet do not lie very closely together at all, a fact which will not surprise the experienced perfumer. The same observation can be made for other odorants which are considered erogenous by the general public, such as amber and musk. Apparently no single odorant, be it of animal, vegetable or synthetic origin, possesses a clear-cut erogenous effect. In high concentration nearly all of the materials in question are described as unpleasant and aggressive. The perfumer knows from experience that it usually takes very small proportions of strong, often disagreeable, even fecal odors to achieve an erogenous effect in a blended perfume. This fact was first pointed out and explained by Jellinek (9).

To test the described method, a relatively neutral perfume of a simple lavender type was developed (Step 1). By adding 15% of an "animal" perfume oil composed of nitro musks, civet and synthetic amber an attempt was made to achieve a noticeable erogenous touch (Step 2). Step 3, aimed at a maximal erogenous effect, was made by adding 40% of the "animal" compound to the basic lavender composition (Fig. 6). The positions of these three compounds are not too far removed from one another. If the point which characterizes the ideal concept of an erogenous odor is taken into consideration it becomes ap-

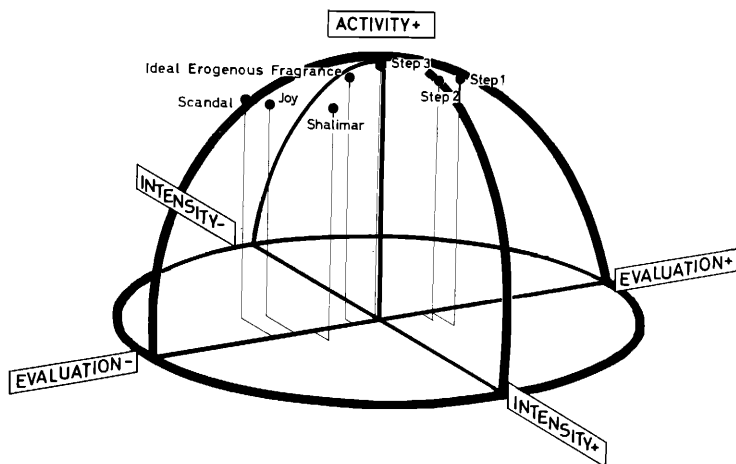


Figure 6. Odor description space showing experimental approach to ideal erogenous fragrances and some commercial perfumes

parent that the stepwise additions did indeed result in a progressive approximation of the judges' mental image of an erogenous odor.

An obvious thing to try at this point is to find out where the modern French luxury perfumes fit into the odor space. This would be a way of testing whether these creations are more distinctly erogenous than are other perfume compounds. With the consent of the manufacturers, the three well-known perfumes, "Shalimar," "Joy" and "Scandal" were selected (Fig. 6).

Although these perfumes are quite different from one another (and although the judges did not know the names of the perfumes), an analysis of the profiles showed that all three were considered to be quite close to the image of the ideal erogenous fragrance. This is not too surprising in view of the reputation of these perfumes. Still, the results are valuable since they constitute, more nearly than any data heretofore available, an objective proof that these perfumes represent a close ap-

proximation to the consumers' ideal. Moreover, the experiment confirms that the erogenous message of these luxury perfumes comes across, even when the person smelling them has no extraneous clues such as the name of the perfume or its advertising copy. Furthermore, a rather interesting and amusing observation was made: not only with these perfumes but with all odor tests there were no statistically significant differences between the reactions of male and female judges.

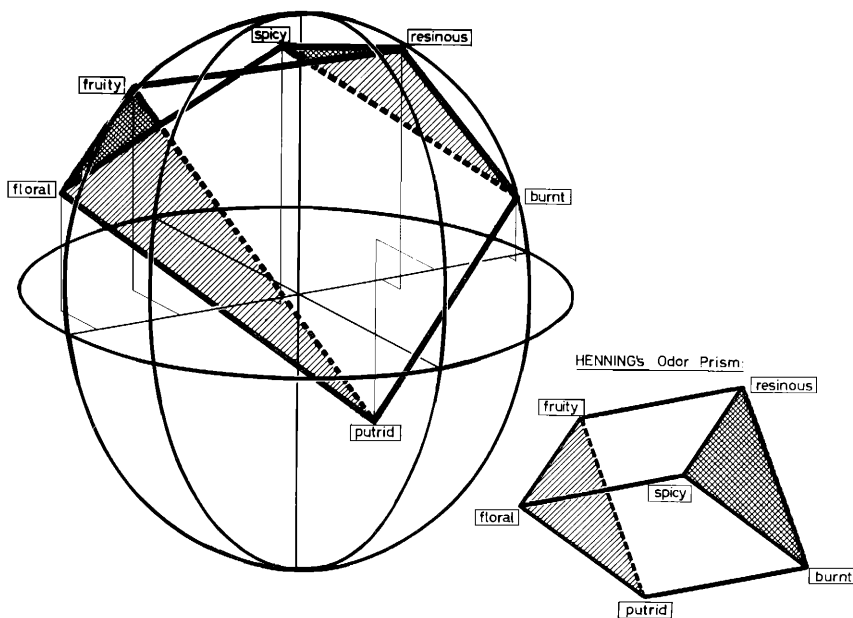


Figure 7. Henning's odor prism in odor space

Nor was there any relation between the resulting profile and the personality type, hair color or age, educational level or socioeconomic status of the respondents.

Such proof as was achieved here could not have been accomplished by the use of existing classification systems such as those of Crocker, Henning or Zwaardemaker (10). Nevertheless, reference will be made once more to Henning's system, devised nearly 50 years ago. Henning's prism was examined in the light of the semantic differential technique by asking judges to draw up the profiles of their concepts of Henning's six primary odors: fruity, floral, spicy, resinous, burnt and putrid. If Henning's system were compatible with the one described here, then

the points representing his primary odors should occupy positions in the odor space such that a prism would be formed by connecting them.

The diagrams show that this is not the case. On the right, Henning's prism is shown in its theoretical form, on the left the way it appears from the odor profiles of the judges; it does not form a prism. The majority of known odors cannot be described by use of Henning's six primary odors.

Crocker was inspired by Henning's work to develop a revised model. He assumes the existence of only four basic odors: acid, fragrant, burnt and caprylic. Each odor is described by indicating, on an eight-point scale, to what extent each primary odor is a component of the odor being described. A serious weakness of this system, as Ross and Harriman (11) pointed out, lies in the fact that there is no proof that these four basic odors really represent those characteristics which make one odor different from another. Moreover, the use of only four characteristics leads to an unstable profile; in practical use, it is not reproducible. It was found that stable profiles could be obtained only through the use of a large number of polarities—29 in the case described here.

It must be concluded that the traditional classifications of odors fail to provide the means for a reliable description of odor impressions or of mental images of fragrances. This was one of the reasons why an attempt was made to develop a new method which would be useful as a guide to the development of appropriate and successful perfumes.

#### SUMMARY

In the field of fragrance it is feasible to obtain a description of a mental image of an ideal. It is feasible also to determine to what extent an existing fragrance approaches this ideal. In Western culture there exists a definite image of the ideal erogenous fragrance. Using the described method, which was developed in cooperation with Prof. K. Eyferth and Dr. R. Randebrock, it is possible to create fragrances which come close to this ideal. This odor-psychometric method is, in several ways, more practically useful than the classification system described in the literature. It permits an insight into the fine structure of the world of odor perception, a world which is complex and mysterious even for the expert.

The data obtained by the use of the semantic differential method, in spite of the subjectivity of the individual judgments which make up the profiles, are reproducible and in a sense objective and reveal the existence

of relations which seem to have general validity. These data make possible the selection of the most appropriate fragrance, the one which most closely approximates the recognized ideal image. If the manufacturer, market researchers and psychologically trained perfumers cooperate in the search for the most effective perfume for a given product, this new method can become a powerful tool in the search.

The method is new and stands at the beginning of its development. Frequent practical application will certainly lead to further improvements and refinements. But even at this early stage, its advantages are apparent: chance or the taste of a few individuals—obstacles in the selection of a truly appropriate fragrance—are eliminated, and the decision is based squarely on the verdict of potential buyers and users of the product.

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