Role of Specific Postingestional Effects and Medicinal Context in the Acquisition of Liking for Tastes

PATRICIA PLINER
University of Toronto

PAUL ROZIN, MYRA COOPER and GEORGE WOODY
University of Pennsylvania

The role of positive postingestional effects in the acquisition of liking for tastes was explored. The purpose of the first study was to ask whether changes in liking are associated with the repeated ingestion in a medicinal context of a drug which produces positive consequences and which has a distinctive flavor. The results revealed no evidence for an acquired liking overall, and a more fine-grained analysis found no evidence that any type of positive effect which occurred was associated with an increase in liking. In a second study, using a retrospective questionnaire, an examination was made of the changes in liking for a wider range of medicines with tastes as well as for a number of foods. Again, none of the specific positive medicinal effects (types of symptom relief) examined were especially effective in enhancing liking. However, comparison of data for foods and medicines revealed that the latter are less likely to come to be liked than are the former. One possible explanation for these results is that when substances are ingested with the primary motivation of obtaining positive postingestional consequences, as in the case of medicines, this extrinsic motivation interferes with the acquisition of liking.

The primary purpose of this paper is to explore the role of positive postingestional effects in the acquisition of liking for tastes. There is a large body of evidence on the role of negative postingestional effects in the acquisition of food dislikes. Food aversions in humans often occur after one pairing of a food with a negative event (Bernstein, 1978; Garb & Stunkard, 1974; Logue, Ophir & Strauss, 1981; Rozin & Fallon, 1980). However, the specific nature of the negative event is of importance. In particular, nausea following ingestion of a food usually leads to a decrease in the food’s palatability while other negative events, such as respiratory distress or hives, produce avoidance but not dislike of the relevant food (Pelchat & Rozin, 1982). Much less attention has been directed at determining whether positive postingestional consequences affect positive changes in liking for tastes with which they are associated. One such consequence, rapid satiation, has been shown to produce increases in liking (Booth, 1982; Booth, Mather & Fuller, 1982). It is possible that satiation, a specific and common effect of food, has the same special role in producing likes as nausea has in producing dislikes. Alternatively, it is possible that any positive event which is associated with a taste enhances its palatability.

Correspondence should be addressed to: Patricia Pliner, Department of Psychology, Erindale College, University of Toronto, 3359 Mississauga Road, Mississauga, Ontario, Canada L5L 1C6.
EXPERIMENT I: HEDONIC EFFECTS OF PAIRING NARCOTICS WITH A DISTINCTIVE TASTE IN FORMER HEROIN ADDICTS IN A METHADONE MAINTENANCE PROGRAM

The first study asks whether changes in liking are associated with the repeated ingestion in a medicinal context of a drug which produces positive consequences and which has a distinctive flavor. Hedonic changes in reaction to the taste of a concoction of methadone (a bitter opiate) and Tang (an orange-flavored beverage) in former heroin addicts are examined. Methadone is an orally administered opiate that is legally available to heroin addicts as part of a drug treatment program. Its ingestion is followed by positive effects such as mild euphoria and the termination of incipient withdrawal symptoms. The study asks whether, in the course of methadone treatment, individuals come to like or to increase their liking for the taste of Tang or bitter Tang (as it would taste when combined with methadone).

Method

Experimental subjects were 20 male former heroin addicts (age range = 25–56 years,  ̅X = 33.4) in a methadone maintenance program at a Veteran’s Administration Hospital. Control subjects were 22 out-patients (age range = 24–48 years,  ̅X = 35.7) from the same community, seeking medical assistance at the same hospital. None of the controls was currently or had ever been in a methadone program. The experimental subjects had been on methadone for a mean of 59.6 months, or about 1,800 doses. The mean current dose was 42.5 mg and was always consumed in a Tang vehicle. Each subject was interviewed for about half an hour concerning his history of methadone treatment and current dose. Subjects also indicated whether they typically experienced each of 13 symptoms just before and after their daily ingestion of methadone. The symptoms were: sweaty, nervous, angry, nauseous, down, good, relaxed, high, happy, poor appetite, loose bowels, cramps, runny nose. Each subject was asked to recall his pre-methadone treatment and current liking for orange juice, Tang, and Tang with methadone (as they normally drank it) and rate them on a standard nine-point hedonic scale originally developed by Jones and Thurstone (1955) for measuring soldiers’ food preferences. Each point on this scale is labelled (9 = like extremely, 8 = like very much, 7 = like moderately, 6 = like slightly, 5 = neither like nor dislike, 4 = dislike slightly, 3 = dislike moderately, 2 = dislike very much, 1 = dislike extremely) and the original scaling data reveal that the verbal labels are rather evenly spaced and symmetrical around the neutral point. Finally, subjects were asked to taste and rate (using the same nine-point scale) six beverages (5 ml each). The beverages were: apple juice, orange juice (frozen reconstituted), Tang, and three samples of Tang made bitter with quinine hydrochloride, in concentrations of 0.1 mM, 0.5 mM and 1.0 mM. These levels of quinine were selected to bracket the range of bitterness produced by methadone in Tang at the levels employed in the methadone program associated with this project. Subjects sampled each of the six beverages in the order described above and rated each. They then repeated their ratings on a second series that was identical to the first although the subjects were not so informed.

Control subjects were run with an abbreviated protocol. They were briefly queried to determine that they had no experience with methadone, asked if they had tasted Tang, and then given the same six-beverage tasting and rating test as the experimental subjects.
Results

Experimental subjects reported a mean change in 5.1 symptoms in the positive direction following the ingestion of methadone. The most common reported changes were: increased relaxation (55% of subjects), improved appetite (50%), decreased nervousness (45%), and decreased runny nose (45%). Thus, for most subjects, ingestion of methadone was followed by positive consequences.

There was no evidence for an acquired liking for either Tang or bitter Tang. The differences between current hedonic rating of relevant items and recalled rating of the same items before methadone treatment were very small (means of 0.10 for orange juice, 0.16 for Tang and −0.30 for Tang with methadone) and non-significant. Four subjects showed a positive change in Tang plus methadone; the symptom change patterns of these four subjects showed nothing in common. Only one subject reported a change from negative to positive (rating of 4 to 6) on Tang plus methadone.

In the direct ratings of sample beverages, shown in Table 1, the mean rating of Tang was well below those of orange or apple juice, and barely positive. The three samples of Tang with quinine all showed negative hedonic ratings, and negativity increased with the amount of bitterness. The beverage sample that was most similar to the Tang with methadone drunk by most of our subjects (0.5 mm quinine) had a very low mean hedonic rating of 1.65; not one subject rated this beverage as liked (greater than 5). In addition, experimental subjects did not give significantly higher ratings of Tang (plain or with quinine added) than controls; indeed, for two of the four Tang stimuli, their hedonic ratings were lower than the ratings of the control subjects.

There were no significant correlations between number of experiences with Tang plus methadone and any measure of current liking or change in liking for Tang, Tang plus methadone, or Tang plus quinine.

A separate analysis of the data for each symptom was also done, dividing the methadone subjects into two groups: those for whom methadone produced a positive change for that symptom and those for whom it did not. Subjects in the former groups did not differ significantly from those in the latter in terms of the differences between current hedonic rating and recalled rating of the same item for orange juice, Tang, or Tang with methadone or in terms of direct ratings of the sample beverages. In

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hedonic ratings of beverages</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beverage</th>
<th>Mean hedonic rating(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Methadone subjects ((N=20))</td>
</tr>
<tr>
<td>Apple juice</td>
<td>7.58</td>
</tr>
<tr>
<td>Orange juice</td>
<td>7.02</td>
</tr>
<tr>
<td>Tang</td>
<td>5.17</td>
</tr>
<tr>
<td>Tang + 0.1 mm quinine</td>
<td>3.25</td>
</tr>
<tr>
<td>Tang + 0.5 mm quinine</td>
<td>1.65</td>
</tr>
<tr>
<td>Tang + 1.0 mm quinine</td>
<td>1.30</td>
</tr>
</tbody>
</table>

\(^a\) Ratings were made on nine-point scales with higher numbers representing greater liking. The datum for each subject is the mean of the two ratings by each subject.
particular, it was noted that although seven subjects reported experiencing nausea prior to ingesting Tang with methadone and relief of the nausea following ingestion of Tang with methadone, these subjects did not differ from the remainder on any of the relevant hedonic ratings.

Finally, for each experimental subject the total number of symptoms on which positive change was reported was computed and this number was correlated with the beverage ratings, both direct and recalled. None of the correlations was significant, indicating that the magnitude of positive change produced by ingestion of methadone was not related to the magnitude of change in liking for its taste.

Discussion

The results of the first study show that, despite the positive postingestional consequences associated with bitter Tang, subjects did not come to like this taste. One interpretation of these results is that it is not the case that the occurrence of all positive postingestional effects enhances palatability. It is still possible, of course, that there are other positive consequences (in addition to the already demonstrated satiation) which do so.

However, there is another possible interpretation for the results. Although it is possible to consider Tang a food, in the present study it clearly had the characteristics of a medicine. Methadone maintenance patients typically refer to their daily visits to the hospital as “coming in for my medicine”. Rozin and Fallon (1980, 1981) have distinguished between sensory-affective (e.g. liking the taste) and anticipated consequences (e.g. “good for me”) motivations for acceptance or rejection of foods. It is possible that consumption of an edible substance that is motivated primarily by anticipation of beneficial postingestional effects, i.e. in a medicinal context, interferes with the acquisition of a liking for the taste of that substance.

This notion can be derived from self-perception theory (Bem, 1967) and some related work by Lepper (1980) and others on “overjustification”. Self-perception theory posits that one's attitude with respect to some object may be based on inferences made after observing one's behavior toward that object and noting the presence/absence of any extrinsic justifications for the behavior. For example, someone who observes him/herself eating a particular food in the absence of any extrinsic justification will infer that he/she must have a positive attitude toward (like) that food. The overjustification hypothesis predicts that if a liked food is consumed in the presence of some salient external contingency (such aspromise of reward or avoidance of punishment), liking for that food will decrease. The extrinsic reward undermines intrinsic value because the individual, noting the contingency, attributes consumption to it rather than to liking for the food (“I must be eating this because of the reward and not because I like it”). Supporting this overjustification notion, L. L. Birch, Birch, Marlin and Kramer (1982) rewarded children for consuming moderately palatable beverages by providing access to attractive play activities; they found decreases in preference for the beverage in a subsequent rating session.

If an initially disliked substance were consumed explicitly because of an external reward, self-perception theory would predict that it should not become liked. The individual, noting that he/she was rewarded for eating it, would (correctly) infer that he/she does not like it but rather ate it to obtain the reward. Even though other factors which might otherwise result in increased liking were present (e.g. mere exposure), the
individual would continue to attribute consumption to the external factor rather than to liking for the food, and liking would not increase.

Thus, the failure to demonstrate an increase in liking for the taste of bitter Tang in the present study may have little to do with the lack of efficacy of the particular positive consequences it produces. It may be rather that in a medicinal context no positive consequence is effective because the anticipated positive consequences interfere with the acquisition of intrinsic value.

EXPERIMENT II: A SURVEY OF LIKING FOR MEDICINES AND FOODS

In order to explore both interpretations for the present data more fully, a second study was conducted. In this study, subjects were surveyed about their experiences with, and liking for, a wide variety of medicines with distinctive tastes and foods. While the results of this study can be only suggestive, it was designed with the intention of obtaining information relevant to three issues.

The first issue has to do with the specific nature of the positive consequences associated with a taste. More precisely, the present authors were interested in determining whether the specific nature of the symptom alleviated by a medicine was related to increases in liking for its taste. Since the data on conditioned taste aversions show consistently that negative gastrointestinal events are especially potent in producing dislike, it might be anticipated that alleviation of gastrointestinal symptoms is similarly potent in producing likes. In particular, nausea-reducing substances might be expected to show the greatest effects. More generally, the question addressed is: are there any particular symptoms, the alleviation of which leads to increases in liking? Although the symptom analysis of the methadone data provides some information relevant to this question, the present authors wished to investigate a different (although overlapping) set of symptoms with a larger sample of subjects.

The second issue has to do with the magnitude of positive change produced by a substance. It is possible that changes in liking for a taste produced by positive postigestional consequences are a function not of the specific nature of the consequences, but of their magnitude. That is, perhaps medicines which produce greater subjective relief support greater changes in palatability. While one analysis of the methadone data was directed at this issue, that measure of the magnitude of positive consequences was number of symptoms relieved rather than degree of relief for a particular symptom.

The last issue has to do with a distinction between food and medicine which was foreshadowed by the earlier discussion of the effect of extrinsic consequences on the acquisition of intrinsic value. It is suggested that, because of the salience of anticipated consequences in the use of medicines, they should be less likely to come to be liked than foods, even if both were equally palatable initially.

Method

Subjects were 220 undergraduate students at the University of Toronto who completed a questionnaire. This survey followed a pilot study with 68 undergraduates at the University of Pennsylvania which obtained similar results. The questionnaire began with a list of common medicines which have distinctive tastes, organized by category of medicine (e.g. laxatives: Ex-Lax, Milk of Magnesia, castor oil, mineral oil).
Other categories (with examples) listed were: constipators, diuretics, antacids, decongestants, pain relievers, tranquilizers and antibiotics. Subjects were instructed as follows:

“List all those medicines that you have ever taken, or are taking at the moment, that have a fairly distinctive taste, including any not mentioned above. If you have listed more than three medicines, choose three that best meet the following criteria and answer the following questions for only these three medicines. The medicines you select may not meet all, or even most, of these criteria. Remember, that we are only concerned with medicines that have a distinctive taste. Therefore, most of the medicines you list would probably come in liquid form. If they are in pill form, they should be chewable.”

The criteria for selection were listed in order of decreasing importance:

“(1) medicines that you initially disliked but came to like. It is most important to include any medicines in this category, even if they meet none of the other criteria; (2) those medicines that you have taken most frequently; (3) medicines that had the strongest, most obvious effect on your symptoms (if there were any symptoms); (4) those medicines you have taken most recently”.

Using the standard nine-point hedonic scale, subjects rated their liking for the taste of each medicine “when you first took the medicine” and “after you had stopped taking it, or now, if you are still taking it”. These measures were called “liking at Time 1” and “liking at Time 2”. Subjects listed all the symptoms that each medicine was taken to relieve. For each symptom, they recorded its degree of unpleasantness (by marking one of nine categories labelled at the extremes by “extremely unpleasant” and “extremely pleasant”) and the extent to which it was relieved by the medicine (by marking one of five categories: 1 = not at all, 2 = slightly, 3 = moderately, 4 = almost completely, 5 = completely). Subjects also reported the number of times they had consumed each medicine.

Finally, subjects completed a questionnaire on liking for 34 foods. The foods were selected to include many items that might be unpalatable at first. Subjects indicated whether they had tried each food, and, if so, how many times they had eaten it. For foods that had been tried, they also rated liking for the taste of the food the first time it was tasted and the taste now, using the standard nine-point hedonic scale. In the analysis, data were included only from subjects who had tried the food in question.

Results

The first analysis of the data was intended to determine whether the alleviation of any particular symptom(s) is associated with a greater likelihood of reported increases in liking. Since, within a particular medicine category, the major symptom affected was highly consistent across subjects, the analysis was carried out by comparing medicine categories. It can be seen in column 3 of Table 2 that although the medicine categories differed significantly in terms of their initial palatabilities, changes in liking (column 5) did not differ significantly as a function of medicine category. It is noted that, if a similar analysis is performed with symptom category for the first-listed symptom rather than medicine category as the independent variable, the results on changes in liking remain non-significant (F = 0.93).

The second analysis was intended to determine whether subjects’ reports of magnitude of post-ingestional consequences were related to their reports of changes in liking. A net relief score was computed for each medicine by subtracting the rated
Table 2
Reported liking relief and exposure frequency for five types of medicine

<table>
<thead>
<tr>
<th>Medicine</th>
<th>( N )</th>
<th>Liking at Time 1 ( T_1 )</th>
<th>Liking at Time 2 ( T_2 )</th>
<th>( T_2 - T_1^a )</th>
<th>Net relief(^b)</th>
<th>Exposure frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decongestants</td>
<td>255</td>
<td>4.84</td>
<td>5.41</td>
<td>0.63</td>
<td>1.07</td>
<td>114</td>
</tr>
<tr>
<td>Laxatives</td>
<td>40</td>
<td>2.36</td>
<td>3.18</td>
<td>0.78</td>
<td>1.37</td>
<td>21</td>
</tr>
<tr>
<td>Constipators</td>
<td>35</td>
<td>3.03</td>
<td>4.06</td>
<td>1.03</td>
<td>1.80</td>
<td>26</td>
</tr>
<tr>
<td>Antacids</td>
<td>66</td>
<td>3.46</td>
<td>4.18</td>
<td>0.81</td>
<td>1.29</td>
<td>42</td>
</tr>
<tr>
<td>Pain–fever relivers</td>
<td>95</td>
<td>4.01</td>
<td>4.36</td>
<td>0.47</td>
<td>1.61</td>
<td>125</td>
</tr>
</tbody>
</table>

\( ^a \) Liking at Time 1 data were missing for some subjects. As a result, this value is not usually the same as the differences between columns \( T_1 \) and \( T_2 \).

\( ^b \) Net relief is amount of relief for first-listed symptom, varying from 5 (complete) to 1 (not at all), minus degree of unpleasantness of same symptom (1 = extremely unpleasant to 9 = extremely pleasant).

\( ^c \) Degrees of freedom for ANOVA are 4, 451–494.

\( *** p < 0.001, ** p < 0.01, * p < 0.05. \)

unpleasantness of the first-listed symptom (where a low number means most unpleasant) from the reported amount of relief (5 = completely to 1 = not at all) for that same symptom. The rationale for using this composite measure was simply that the perceived magnitude of the positive post-ingestional consequences is probably related to both the severity of the symptom alleviated and the degree of its alleviation. With this index, if two symptoms are relieved to an equal degree but one is more unpleasant than the other, the former will receive a higher net relief score than the latter. Similarly, if two symptoms are equally unpleasant and one is relieved to a greater extent than the other, the former will receive a higher net relief score than the latter.

The net relief scores are presented for each medicine category in column 6 of Table 2. There is no obvious relationship between reported hedonic change for each type of medicine and its rated net relief. Although constipators showed both the greatest increase in liking and the greatest net relief, the correlation across all subjects between rated net relief for the first listed symptom and reported hedonic change did not approach significance \((r = -0.053, NS)\). It is noted that, if the components of the composite index, amount of relief and disturbingness of symptom, are correlated separately with hedonic change, the correlations are similarly low and non-significant \((r_{relief} = -0.04, NS, r_{disturbingness} = 0.05, NS)\).

The question of whether medicines in general are less likely to increase in hedonic value than are foods is now considered. Since medicines were consumed less frequently than foods, reported exposure frequency was equalized by finding a maximal level of exposure for each food such that the mean of all exposures below that level would equal 100 (the mean exposure frequency for medicines; cf. column 7, Table 2). Instances of exposure at or above this level were discarded in the analysis. In addition, since direct comparison of reported hedonic increase for foods and medicines requires equalization of their initial hedonic values, changes in hedonic value for foods and medicines were calculated separately for each initial hedonic value from 1 to 8 (there is no possible improvement for initial ratings of 9).
For each initial hedonic level, the percentage of instances in which subjects reported an increase in liking was computed. In Table 3 it can be seen that the differences between medicines (column 4) and foods (column 5) are significant only for items that were initially rated as neutral or liked (hedonic ratings of from 5 to 8). There is a much more substantial difference between foods and medicines in the percentage of acquired likings, i.e. cases that reported moving from disliked (initial ratings less than 5) to liked (final ratings greater than 5). For all four initial negative hedonic levels, there is a significantly greater percentage of acquired likes for foods than medicines ($p < 0.01$ or better by $\chi^2$). Averaging across the four initial hedonic levels, ratings for 13.7% of medicines and 32.7% of foods became positive, a 19 percentage-point difference.

This substantial difference in the frequency of acquired likes only sets a lower bound for a true population difference between medicines and foods. Subjects were explicitly asked to select instances in medicines that came to be liked, whereas the present authors selected all the instances of foods. Therefore, while the absolute level of incidence of acquired likings for medicines that is reported here may well be accurate, the percentage of all initially unpalatable medicines that become liked is surely overestimated in the present sample. It is not possible to correct for this bias, but it can be noted that it operates to exaggerate the relative incidence of acquired likes for medicines. The equalization of exposure for foods also produces a bias that operates in the direction of minimizing a true food–medicine difference.

**General Discussion**

Within the framework of a medicinal context, the present results indicate that, of the postigestional effects investigated, none has special potency for enhancing liking. The data on aversions in humans implicate nausea as a specific potent agent in negative affective change (Pelchat & Rozin, 1982). Entertaining the parallel hypothesis, that reversal of nausea would be potent in producing positive affective change, it would be

### Table 3

*Percentages of subjects reporting increases in liking and acquired likes for medicines and foods*

<table>
<thead>
<tr>
<th>(1) Initial hedonic value</th>
<th>(2) Number of instances</th>
<th>(3) Percentage of subjects reporting increases</th>
<th>(4) Percentage of subjects reporting acquired likes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medicine</td>
<td>Food</td>
<td>Medicine</td>
</tr>
<tr>
<td>1</td>
<td>114</td>
<td>552</td>
<td>36.0</td>
</tr>
<tr>
<td>2</td>
<td>49</td>
<td>372</td>
<td>57.1</td>
</tr>
<tr>
<td>3</td>
<td>65</td>
<td>336</td>
<td>61.5</td>
</tr>
<tr>
<td>4</td>
<td>72</td>
<td>341</td>
<td>62.5</td>
</tr>
<tr>
<td>5</td>
<td>95</td>
<td>382</td>
<td>24.2***</td>
</tr>
<tr>
<td>6</td>
<td>55</td>
<td>446</td>
<td>32.7*</td>
</tr>
<tr>
<td>7</td>
<td>43</td>
<td>539</td>
<td>3.6*</td>
</tr>
<tr>
<td>8</td>
<td>28</td>
<td>391</td>
<td>3.6*</td>
</tr>
</tbody>
</table>

*p < 0.05 by $\chi^2$, **p < 0.01 by $\chi^2$, ***p < 0.001 by $\chi^2$. Data presented separately for foods and medicines at each initial hedonic value. Foods equalized in exposure with medicines. Percent increase is the percentage of cases where the hedonic rating now is above the hedonic rating on initial exposure. Percent acquired like is the percentage of cases in which an item with an initially disliked rating (1–4 on the hedonic scale) is now given a liked rating (6–9 on the hedonic scale).

*p < 0.05 by $\chi^2$, **p < 0.01 by $\chi^2$, ***p < 0.001 by $\chi^2$. Data presented separately for foods and medicines at each initial hedonic value. Foods equalized in exposure with medicines. Percent increase is the percentage of cases where the hedonic rating now is above the hedonic rating on initial exposure. Percent acquired like is the percentage of cases in which an item with an initially disliked rating (1–4 on the hedonic scale) is now given a liked rating (6–9 on the hedonic scale).
predicted in the medicine survey that the largest effect should occur for that group of medicines most associated with reversal of nausea, the antacids. In the present study, this group did not produce the largest affective change. However, according to the subjects' reports, these medicines were taken primarily to relieve gastrointestinal pain, which is not implicated as a potent factor in learned aversions. In this study, there were no cases in which nausea was listed as a symptom and the subject indicated at least moderate relief from this symptom. However, in the pilot study, there were 16 such cases. The net change in rated liking was 0.69, with six out of 16 subjects reporting an increase in liking. This value is very close to the overall value for all medicines, suggesting that there is not a special role for nausea reversal. The data from the methadone study also show no particular efficacy for nausea reversal.

The present results also indicate that hedonic change is unrelated to the magnitude of positive consequences. It is worthy of mention that the “positive” postigestional consequences investigated in this study can in almost all cases be described as relief of negative symptoms. It is possible that the occurrence of events which are absolutely, rather than relatively, positive is necessary to induce liking. The effectiveness of satiation in enhancing liking (Booth, 1982; Booth et al., 1982) may result from its pleasant properties or from the alleviation of an unpleasant state of hunger.

Finally, despite strong conservative biases in the data selection and presentation (equalizing food and medicine for exposure frequency and encouraging selection of medicines that showed enhanced liking), the present data reveal that foods are more likely to become liked than medicines. One interpretation of this result is that it simply reveals subjects' assumptions about the relative appropriate hedonic status of medicines and foods. An explanation that the present authors find more interesting is that anticipated beneficial consequences of ingesting a medicine provide an extrinsic justification for its ingestion which blocks acquisition of intrinsic liking.

The present authors realize that the distinction between extrinsic and intrinsic motivation is somewhat problematic when applied to the food–medicine distinction. After all, one reason for consuming foods is nutrition, which surely qualifies as extrinsic. In order to explain the greater liking for foods in terms of the intrinsic–extrinsic distinction, it must be assumed that non-nutritional factors form a significant part of the motivation for food consumption. This seems less reasonable for staple items (e.g. bread, meat), and more reasonable for spices, flavorings, desserts and many beverages. It may be true that acquired likes are greater for the latter items. Folk wisdom that “if it tastes good, it can’t be good for you” certainly fits the intrinsic–extrinsic distinction.

Another issue has to do with the natural history of the development of likes for foods. Often, children initially ingest adult foods under social pressure. Their desire to be adult or to conform causes them to ingest items which they dislike (e.g. cigarettes, chili pepper) (Rozin, 1982). Yet, after some time of forced (one could say socially “beneficial” motivation) ingestion, the item comes to be liked for its own sake. If this description is fair, then extrinsic control leads into intrinsic control—hardly the antagonism discussed here. This is considered to be a serious challenge to the overjustification explanation. It may be that the “way out” is to formulate the early status of exposure as imitation of admired others rather than forced compliance.
REFERENCES


Received 7 February, 1984; revised form 11 March, 1985