it. If one is looking for a ringing endorsement of either plurality or approval voting, our results provide neither. Under plurality voting, shifts in behavior to avoid a wasted vote, along with other, more subtle reactions to expectations, obviously occur. Under approval voting changes also occur, mostly, it would appear, in order to "go with a winner." Thus, voting under both systems is highly reactive, and it is not obvious to us that voters would be more satisfied or somehow better off under approval voting (though they would perhaps be no worse off either).[10]

If, instead, one approaches our results with the expectation that approval voting would eliminate strategic behavior because one can vote for both a weak and a strong candidate, or if one begins with the hypothesis that individuals will simply "vote their preferences" because strategic analysis is too complicated, then our results provide a rude awakening. Strategic behavior, though relatively infrequent, was manifested in several ways. And the tendency to vote for winners showed convincingly that voters will react to political circumstances under approval voting just as they currently do under plurality voting.

The introduction of approval voting would have a variety of consequences, both good and bad, and there is room for disagreement about the overall balance. But it would be a mistake to believe that approval voting would lead voters to express their preferences without regard to the political world around them. Whatever its properties as an abstract system, approval voting is not immune to the behavioral dynamics that influence real election outcomes under any voting procedure. □

[10]Indeed, it is by no means clear what voters want from a voting procedure in the first place. In our study, 44 percent of the students had a "favorable" reaction to approval voting. "Favorable" reactions were more common among those who cast identical approval votes under all three scenarios (52 percent favorable) than among those whose approval votes varied with political circumstances (30 percent favorable). There were no clear differences in reactions to approval voting between Hart and Mondale supporters, or between voters who voted sincerely in all three plurality votes and those who did not.

Should You Brush Your Teeth on November 6, 1984: A Rational Choice Perspective*

A Wuffle**
School of Social Sciences
University of California, Irvine

American educators have long been concerned about whether our citizens brush

*An earlier version of this paper was not prepared for delivery at the Conference on Voter Turnout, May 16-19, 1979 at the Half Moon Inn, San Diego, California. Resemblances between toothbrushing and certain electoral behavior of interest to political scientists are, therefore, no doubt, purely coincidental.

**A Wuffle is an assistant to professor, School of Social Sciences, University of California, Irvine. Among his previously published works in mathematical muddling are such neglected classics as "Mo Fiorina's Advice to Children and Other Subordinates," *Mathematics Magazine* 52, 5 (November 1979), 292-297; "The Pure Theory of Elevators," *Mathematics Magazine* 55, 1 (January 1982), 30-37; "Monopoly© Is a Capitalist Plot: A Hegemonic View of Games as Instruments of Economic Indoctrination," *Simulation & Games* (June 1978), 252-254; and "A Note on Abraham Lincoln in Probabilityland," *Theory and Decision* 11 (1979), 453-455 (published under a pseudonym). He is also the author of "Should Political Scientists Be Paid to Think?" and coauthor of "Should Political Scientists Think to be Paid?" A Wuffle's chief aspiration is to learn more about misbehavior in small groups.

their teeth. In our schools children are exhorted to brush their teeth and warned that dangerous consequences will follow if they do not. Nonetheless, the rate of toothbrushing seems to have fallen in the general population (1980 is a partial exception), and the blame can't be attributed solely to poor dental care socialization of the younger generation. Rather the decline in toothbrushing appears among a wide range of citizens. This decline has been blamed on a variety of causes, including a growing lack of respect for the role of teeth in our society, which some scholars believe to have been intensified by the Wonderbread scandal.

One group of scholars, using what they call a rational choice approach, has developed a model to explain the conditions under which people will brush their teeth, and also to explain which of the two American styles of toothbrushing, U (up and down) and S (side to side), citizens will adopt.[1] Any single day's brushing will have an imperceptible effect on whether or not the citizen does or does not get C_0, zero cavities, or C_1, one cavity. Hence, on any given day, rational citizens should not brush their teeth.

This "rational choice" view has distressed a number of scholars, since it seems to imply that *nobody* will brush their teeth. (Clearly, it is costly to brush one's teeth in time and energy, not to speak of the cost of periodically buying a new toothbrush.) Since most citizens still do brush their teeth, this "rational choice" view quite obviously makes little sense (cf. Grofman, 1983). On the other hand, some scholars (see, for example, Niemi's 1977 article in *Public Health*) have rebutted by pointing out that many people actually get pleasure from brushing their teeth and that toothbrushing is a topic of family conversation and, thus, in many ways a social rather than an individual act.[2,3] Moreover, one classic empirical study in the *American Dental Science Review* (Riker and Ordeshook, 1968) showed that many people feel that brushing their teeth is a duty, regardless of its effect on tooth decay. Indeed, this perception of duty was more important than other instrumental factors.

Other scholars in the rational choice tradition have sought to show that brushing can sometimes be rational if you have a strong fear of tooth decay and don't care about probabilities, but only about worst possible cases. This minimax-regret model has, however, never been felt to be particularly convincing by anyone other than its propounders.[4]

We believe the usual analysis of the rational choice model of toothbrushing is

[1]Even dental scientists are not in agreement on which style of brushing is best. Indeed, some believe in the merits of regular alternation.

[2]E.g., "Jimmy, did you brush your teeth today?" "Aw, gee, mom, do I have to?"

Laurily K. Epstein has pointed out (personal communication) that some citizens have dentists, dental technicians, or toothbrush salesmen in the family who check to see whether your toothbrush has been used and help you get a new toothbrush if your old one gets broken.

[3]Other more philosophically minded scholars have argued that each citizen is concerned not only with his own decision to brush or not to brush but with that of millions of other citizens. Thus, a citizen is motivated to brush on any given day not solely because of the consequences of that decision for the prevention of tooth decay but for the inspiration it will provide to other citizens. Unfortunately that argument doesn't seem very compelling since the causal nexus between one citizen's toothbrushing activities and that of another seems nonexistent. Indeed, even if we think of the citizen as concerned not with decisions of others but only with decisions of his many future selves, under some philosophic views (e.g., existentialism), there is no causal nexus between an act of not toothbrushing today and an act of not toothbrushing tomorrow. Of course, some might argue that we are what we have been, and that in Brody's felicitous phrasing, "toothbrushing is a self-reinforcing process" (Brody, 1977). This is particularly true in those climates where a failure to brush several times in a row renders your toothbrush inoperable.

[4]Indeed, there is suspicion that at least one of its authors doesn't believe it.

misguided on three counts. First, empirical work on the rational calculus of toothbrushing has been marred by an emphasis on front teeth. Most of work on the perceived relative desirability of side to side vs. up and down styles, and (for reasons incomprehensible to me) virtually all work on brushing vs. nonbrushing, has been confined to the perceived impact of brushing on the upper front teeth only—completely neglecting the fact that the ordinary person generally brushes a number of teeth at once and is at least somewhat concerned (albeit not equally) with all of them. (Cf. "All I want for November is my two front teeth.")

A second difficulty with the usual rational choice analysis is that it treats toothbrushing as a one-shot decision. Since citizens are confronted with a large number of occasions on which they must decide whether or not to brush (and a reasonably large number of teeth which might be brushed on any given occasion), looking at the decision from a rule-utilitarian rather than the customary act-utilitarian perspective seems to be the more sensible approach.[5] This point is reinforced by Weisberg and Grofman's (1981) finding that an excellent predictor of front-two-teeth toothbrushing is previous brushing history; i.e., the decision to brush or not to brush one's two front teeth on any given day seems to reflect a considerable element of choice of a long-run *rule* for action.[6] For example, Weisberg and Grofman (1981) found that 76.5 percent of such decisions in 1976 could be predicted simply by predicting that those who usually brush would continue to do so and those who usually didn't wouldn't. From a rule-utilitarian perspective, individuals (perhaps in terms of some form of *long-run* utility maximization) choose a rule to live by, and only sometimes do they deviate from it.[7]

Third, and most importantly, we must recognize that, for most individuals, the most crucial decision in toothbrushing is probably whether or not to buy a toothbrush.[8] For example, Traugott and Katosh's (1979) Tooth Validation Study shows that 92.4 percent of the decisions to brush or not to brush one's two front teeth in 1976 could be correctly predicted by knowing who owns a toothbrush and predicting that those who do will brush and those who don't won't (cf. Erikson, 1979).[9] The importance of toothbrush purchase for the decision to brush might be explicable in rational choice terms, since the main cost component of the toothbrushing decision is the decision for many individuals to buy or not to buy a (new) toothbrush.[10]

To see why taking into account toothbrush purchase changes the citizen's decision calculus, we need to think of the costs of brushing as having two components, fixed cost (toothbrush pur-

[5]The distinction between "rule" and "act" utilitarianism is an important (although controversial) one in the contemporary literature on social ethics. (See e.g., Rawls, 1955; Smart, 1956; Kaplan, 1961.) To achieve a reasonably high probability of clean teeth, it may be necessary to brush *most* of the time, even though no given toothbrushing is likely to contribute significantly to this end.

[6]In like manner, the decision to buy or not to buy a toothbrush may reflect a decision about the merits of brushing *in general,* not merely on any given day. See discussion below.

[7]Explaining such deviations may require short-run factors, but the issue becomes accounting for deviations *from the rule* the citizen has chosen.

[8]Without a toothbrush, it is impossible to brush either up and down or sideways.

[9]Since citizens are known to lie through their teeth to survey researchers about whether or not they own a toothbrush, I would propose some probing questions to determine who really does own a toothbrush, e.g., "Where did you buy your toothbrush?" "How long ago did you buy it?" "How long do you think it will last?" (cf. Traugott and Katosh, 1979).

[10]We are not arguing that if toothbrushes were free or if everyone were given a toothbrush that would last a lifetime that everyone would brush his/her teeth. Rather, we are noting that of the costs of toothbrushing, purchase of a toothbrush is a major factor. In many states governmental inefficiency makes it difficult to buy toothbrushes most days of the year and most hours of the day and restricts their availability to a limited number of locations. It is well known that reducing the price of toothbrushes close to zero, may not dramatically up the incidence of toothbrush-

chase) and variable cost (toothbrushing). Having purchased a toothbrush, one can brush whenever one thinks it important enough to do so; while the cost of toothbrush purchase can be amortized over a number of brushings. In particular, once one owns a toothbrush, any given decision to brush or not to brush requires incurring only minimal *additional* costs. Furthermore, the decision to purchase a toothbrush is made in advance of *particular* day-to-day decisions to brush or not to brush and is based on a calculation of the desirability that one *may* at some time or times *in the future* wish to brush.[11,12] It is not, as in the usual analysis of the expected value of brushing on any single specified occasion, an event-specific decision. Thus for many citizens, *once having decided to buy a toothbrush*, brushing their teeth is as habitual an act as brushing their teeth (cf. Boyd, 1981).

Of course, we now have to account for why some people choose to buy a toothbrush while others do not!

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ing (Smoke, 1978). In terms of this approach, such a phenomenon can be accounted for if many of those who don't brush are those for whom toothbrush purchase costs are not the principal cost component in their decision to brush or not to brush, are those with especially high variable costs, are those who assign low value to prevention of tooth decay, or are those who attribute low efficiency to brushing.

Note also that our analysis suggests that people who go on trips (and who may not have a toothbrush with them) are less likely to brush, because brushing will necessitate purchase of a new toothbrush.

[11]Citizens may also be prey to something akin to the "gambler's fallacy" of believing that past events affect future probabilities even for independent events (i.e., if 3 reds appear in a row on the roulette wheel, then the next time is more likely to be black than red). The analogue to the gambler's fallacy would be the belief that the more times you brush, the more likely is it that your *next* brushing will be efficacious.

Bernard Grofman (personal communication) has conjectured that individuals who brush their teeth and don't get cavities are more likely to continue to brush than those who brushed but get cavities anyway, even though their brushing cannot be shown to have been responsible for their absence of cavities. (Among sociologists this is known as "superstitious behavior.") In like manner, Grofman has conjectured that individuals who haven't brushed and still don't get cavities will be unlikely to bother acquiring a toothbrush or bother to brush even if they happen to already own one. This notion of toothbrushing as responsive not so much to rational calculations as to previous history of positive reinforcement for brushing/not brushing is, in my view, one which ought to be explored in the future by adding a question to the usual surveys to obtain both recollected previous brushing history and the historical linkage between brushing and the occurrence of cavities. It is rooted in an operant conditioning view of dental socialization.

[12]It is also well known that citizens overestimate the impact of their own brushing activities on the incidence of cavities.

U.S. Withdrawal From UNESCO: Incident, Warning, or Prelude?

Harold K. Jacobson*
The University of Michigan and
The Woodrow Wilson International Center for Scholars

On December 28, 1983 the United States announced that effective December 31, 1984 it would withdraw from the United Nations Educational, Scientific and Cultural Organization (UNESCO). The announcement, which

*Harold K. Jacobson, Jesse S. Reeves Professor of Political Science and a program director in the Center for Political Studies at the University of Michigan, currently a Fellow at the Woodrow Wilson Center, has been the representative of the American Political Science Association on the U.S. National Commission for UNESCO since 1980. He testified on the impact on the social sciences of the U.S. withdrawal from UNESCO before the Subcommittees on Human Rights and International Organizations and on International Operations of the Committee on Foreign Relations of the House of Representatives on April 26, 1984.