The Effects of Threat to One's Belief on Stimulus of Belief
Supporting Arguments

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THE EFFECTS OF THREAT TO ONE'S BELIEF ON STIMULUS OF BELIEF SUPPORTING ARGUMENTS

BY

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THESIS

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INTRODUCTION

The process of persuasion has been written about and studied in abundance since the times of Plato and Aristotle. However, comparatively little research has been done on resistance to persuasion. In fact, to this day, only two series of systematic studies on resistance to persuasion have been reported. The present study will be a logical extension of that research.

Early efforts to study resistance to persuasion focused on the effects of one-sided and two-sided communications. One-sided communications present arguments for a given point of view, without any mention of arguments for the opposing point of view or attempted refutation of them. Two-sided communications present arguments for a given point of view, then go on to enumerate and at least partially refute arguments for the opposing point of view (Insko, 1962).

During World War II, Hovland, Lumsdaine and Sheffield (1949) reported the first investigation of one-sided and two-sided communications. They found no overall difference in the effectiveness of the two types of communications in producing attitude change. Lumsdaine and Janis (1953) replicated these results and found that subjects who were initially presented with a one-sided communication were less resistant to subsequent
counter-communication than subjects who were initially presented with a two-sided communication. The authors theorized that when subjects were led to a positive conclusion, even when negative arguments were presented, they became "inoculated" against the opposing side.

The Lumsdaine and Janis research sparked an important set of systematic and well-controlled studies on resistance to persuasion. These studies, by William J. McGuire and his associates, centered on McGuire's "inoculation theory."

McGuire and Papageorgis (1961) argued that people characteristically defend their convictions by avoiding exposure to counterarguments. However, the authors stated that this self-selective exposure to arguments of "defense-by-avoidance" leaves the subject poorly prepared to resist counterarguments, should he be involuntarily exposed to them. With hardly any practice and little motivation to develop supporting arguments to bolster his belief or to prepare refutations for unsuspected counterarguments, he is left vulnerable to persuasion.

McGuire's inoculation approach to conferring resistance to persuasion draws on a biological analogy. McGuire and Papageorgis stated that people who are brought up in germ-free environments have failed to develop resistance to infection. While they appear healthy, they are extremely vulnerable when suddenly exposed to a massive dose of an infectious virus. These
authors note the two common methods of increasing disease resistance. One is supportive therapy — vitamins, good diet, rest, exercise, etc., and the other is inoculation — injecting a weakened form of the infectious virus to stimulate, but not overcome, the person's defenses. When immunizing against specific diseases, the inoculation method is usually more effective.

Analogous to medical inoculation, McGuire and Papageorgis hypothesized that "the 'supportive therapy' approach of pre-exposing a person to arguments in support of his belief has less immunizing effectiveness than the 'inoculation' procedure of pre-exposing him to weakened defense stimulating forms of the counterarguments" (1961, p. 327). Since McGuire did not believe that attitudes are to any great extent sheltered and protected, he based the former predictions on cultural truisms. The person has most likely avoided counterarguments on such widely accepted beliefs. The four main cultural truisms used in this initial study were health related: (1) "Everyone should get a chest X-ray each year in order to detect any possible tuberculosis symptoms at an early stage"; (2) "The effects of penicillin have been almost without exception, of great benefit to mankind"; (3) "Most forms of mental illness are not contagious"; (4) "Everyone should brush his teeth after every meal if at all possible"; (McGuire & Papageorgis, 1961).
As predicted, it was found that the refutational-same defense, which included mention and refutation of weak forms of the same arguments that were used in a subsequent attacking session, was superior to the supportive defense which provided belief-reinforcing material, but did not mention counter-arguments. Paradoxically, subjects who received a supportive defense, but no attack, demonstrated increased adherence to the truism. Prior to attack, the mean belief levels on a 15-point scale were 14.34 for the supportive defenses, and 13.91 for the refutational defenses. However, when attacking arguments followed exposure to the defenses, mean belief levels were reduced to 7.39 in the supportive conditions, which was not significantly higher than the attack-only condition \((p = .16)\), while the refutational defense maintained beliefs at 10.33, which were significantly higher than both the attack-only and supportive conditions \((p < .001)\). McGuire refers to this direct strengthening effect on the supportive defense and its inability to confer significant resistance to subsequent attacks as the "paper tiger" phenomenon. In the condition which was neither attacked nor defended, the mean belief was 12.62, and in the attack-only condition it was 6.64. Thus, the refutational-same defense is significantly superior to the supportive defense.

To discover what would happen if the attacks did not contain the same arguments that were previously refuted in the
refutational defenses, Papageorgis and McGuire (1961) conducted a second experiment. Using two of the same cultural truisms and extending the interval between immunizing and attacking sessions from two days to one week, Papageorgis and McGuire found that refutational-different defenses are as effective as refutational-same defenses in inducing resistance to persuasion. Like refutational-same defenses, refutational-different defenses mention and refute counterarguments. However, the arguments refuted are different from those used in the subsequent attack message. When followed by attack, the refutational-same and refutational-different defenses produced belief means of 9.25 and 8.70, respectively. These means do not significantly differ from each other but are both significantly greater than the mean for the attack-only condition, 5.73.

McGuire had two reasons for believing that both refutational defenses would be effective immunizers. First, hearing arguments against the truisms being refuted would reduce the impressiveness of any future attacks to those truisms, and second, "a person's pre-exposure experience may make him more aware that his belief is indeed vulnerable to attack and therefore motivate him to develop supporting arguments that make his belief more resistant even to alternative counterarguments presented later" (1961, p. 475). In other words, after hearing his truism attacked, the subject will be motivated to think up more arguments in
favor of his belief. However, McGuire states that the subject needs time to generate these additional arguments. This is why the interval between the immunizing and attacking sessions was extended from two days to one week for the second experiment.

To measure the motivational properties of refutational defenses, subjects were asked to list all the arguments that came to mind in favor of the critical truisms. It was found that subjects who were immunized listed a mean of 2.62 arguments, and subjects who were not immunized listed a mean of 2.32 arguments. Although the difference between these means was not significant (p < .20), the findings are in the predicted direction. Further the non-significant findings could be the result of methodological procedures. McGuire asked subjects to list arguments following the attack message. That attack may very well have been threatening enough to stimulate the control subjects to think up more favorable arguments than they would have without the attack. Thus, McGuire provided no independent measure of the motivational strength of the refutational defenses. Such a measure could have been accomplished by having subjects list the arguments prior to attack. Still, the apparent inability of the refutational treatment to stimulate defenses is inconsistent with McGuire's rationale. Despite the importance of "motivation" to inoculation theory, this was McGuire's only effort to go beyond speculation and actually measure the possible motivating effects of his defenses.
McGuire (1961) went on to study the amount of resistance to subsequent strong counterarguments that would be conferred by pre-exposure to refuted counterarguments under conditions of active, passive and combined refutation. In the active defense, subjects were given a sheet listing two counterarguments and were told to show how the counterarguments could be refuted. In the passive defense, subjects read a message that contained two counterarguments and refuted them in detail. Two days later, the subjects read strong counterarguments against their belief. Instead of being refuted, this time they were validated. In half the cases, the two counterarguments were the same two that the subject previously had seen refuted, while in the other half of the cases the two counterarguments were novel. McGuire found that the passive defense inoculated subjects significantly better than the active in the refutational-same condition, while the active defense was superior in the refutational-different condition. McGuire also found that the refutational-same defense was as effective as the double (active plus passive), but the double was significantly superior to the single defense in the refutational-different condition.

In explaining his results, McGuire (1961) once again discussed the "motivation mechanism":

... the efficacy of the prior refutational defense in producing resistance to novel counterarguments derives mainly from provocative impact of pre-exposing the belief to counterarguments, which brings home to the subject
that the truism is indeed attackable and stimulates him to bolster his belief. (p. 330)

However, McGuire failed to provide data in support of his notion that the refutational treatment stimulates defenses.

McGuire (1961a) examined the order of presentation of defense and attack messages, and also explored techniques for enhancing the effectiveness of the supportive defense. Four types of treatments were employed; supportive-only, refutational-only, supportive-then-refutational, and refutational-then-supportive. The defenses were administered prior to the attacks in half the conditions (inoculation), and after attacks in the remaining conditions (restoration). In the three defenses involving refutations, half the conditions were refutational-same and half were refutational-different. The experimental beliefs again involved truisms. The attacks and defenses were administered to subjects contiguously. McGuire reported that the supportive defense added significantly to the effectiveness of the refutational-different defense. Since the attack followed immediately after the defenses, the refutational-different defense was ineffective in producing resistance. McGuire (1961a) explained this finding as follows:

... the pre-exposure to counterarguments which refutational defense involves makes the person more aware of the vulnerability of his belief and hence motivates him to seek supporting arguments to bolster it ... such bolstering tends to require an appreciable amount of time, since the person is unpracticed in the defense of his "truism". (p. 194)
None of the sequence effects were significant, that is, neither order of presentation of defenses nor the placement of the attack before or after the defense contributed to belief levels.

In studying the "persistence of the resistance to persuasion," McGuire (1962) predicted that the immunity conferred by refutational defenses would decay less rapidly than that conferred by the supportive defenses, and that refutational-different conditions would decay less rapidly than refutational-same conditions. McGuire also predicted that refutational-different defense would increase in effectiveness with the passage of time. The predictions were strongly confirmed. The refutational-different condition did actually increase; a strengthening of the belief occurred when defense and attack were separated by two days. This could be viewed as evidence for McGuire's contention that the refutational messages stimulate defenses. However, McGuire did not test the subjects to see if they actually could list more arguments after two days had passed.

McGuire and Papageorgis (1962) report an investigation on the effect of attack-forewarning in inducing resistance to persuasion. The authors theorized that forewarning subjects of an impending attack would enhance attentiveness to defensive material, thereby increasing resistance to the subsequent attack. McGuire and Papageorgis predicted that the forewarning would
enhance the immunizing efficacy of the supportive defenses more than the refutational. This is based on the assumption that the refutational defenses already contained threatening information while the supportive defenses did not.

As predicted, the mean belief for the combined defenses with forewarning (11.67) was significantly greater than the combined mean belief level without forewarning (10.93). Also, as expected, the supportive defense was enhanced due to the forewarning significantly more so than in the refutational defense conditions. These results do seem to underscore the importance of threat to producing resistance to persuasion; however, whether this threat motivates the subject to seek belief bolstering material was not shown.

Anderson and McGuire (1965) tested effects of a pre-defense reassurance that one's peers are in unanimous agreement with the subject's belief about the truism. It was predicted that pre-defense reassurance would reduce the immunizing effectiveness of the various defenses and that the supportive defense would be weakened more than the refutational defenses. Theoretically, pre-defense reassurance creates overconfidence and the subject fails to adequately assimilate the defense material. However, this "overconfidence" is overcome by the intrinsically threatening component found in the refutational defenses. Both predictions received support. Anderson and
McGuire (1965) explained their findings as follows:

These results are in agreement with the general notion of inoculation theory: to confer resistance to persuasion on these over-protected beliefs, it is better to pre-expose them to threatening, defense-stimulating material rather than to additional reassuring material. (p. 56)

Although the "motivation mechanism" idea is the basis for McGuire's "inoculation theory," his only reported attempt to validate this mechanism (Papageorgis & McGuire, 1961) was unsuccessful.

A second series of systematic studies on resistance to persuasion has been reported by Tannenbaum (1967). This research examines the principle of congruity (Osgood & Tannenbaum, 1955) and its relationships to inoculation theory. Congruity theory is designed to predict the direction and magnitude of attitude change caused by linking together a source and a concept via an assertion. The application to inoculation theory is based upon a communication setting in which a negative statement is made by a favorably evaluated source about a favorable concept. If this occurs, congruity theory predicts a negative shift in attitude toward the concept. Tannenbaum and others examined various methods of eliminating or reducing this negative shift. Tannenbaum explains that "any means of reducing the prevailing degree of incongruity should render the situation more congruous and thus serve to reduce the degree of attitude change" (1967, p. 277). Tannenbaum, Macaulay, and Norris (1966)
attempted to reduce the degree of attitude change, thus reducing incongruity, by dissociating the source from concept. The United States Public Health Service, the positive source, negated any connection with statements which had been "erroneously" attributed to it. The attempt failed, as the results showed the negation or denial treatment to be ineffective in reducing attitude change. However, in an earlier study, (Macaulay, 1965) found that if the source first denied the claims, then took an affirmative position in the opposite direction, the denial treatment is an effective immunizer.

Using the same communication setting which involves a favorable source making a negative statement about a favorable concept, Tannenbaum et al. (1966) also found that source derogation resulted in less incongruity, thus less attitude change, and that the refutational defense is a more effective immunizer than the "concept boost" (supportive) defense. This latter result is in line with the inoculation theory. The final mean belief levels for the concept boost group and attack-only control group were 10.85 and 8.39, respectively (p.< .05). So it seems that the concept boost, or supportive defense, can be effective if administered by a highly credible source.

Combining strategies appears to increase effectiveness. This was shown by Tannenbaum and Norris (1965), who combined source derogation with refutation; Macaulay (1965), refutation
plus denial; and Tannenbaum (1967), source derogation plus concept boost and denial plus concept boost. Although Tannenbaum tested some of McGuire's concepts, he did not measure the theorized "motivation mechanism" which is allegedly contained in the refutation defense.

McGuire's "inoculation theory" has stimulated considerable related research in addition to that of Tannenbaum and his associates. For example, McCroskey concluded that evidence "does seem to have a predictable impact as an inhibitor of counterpersuasion" (1970, p. 194). This and McGuire's findings predict that to enhance resistance, evidence should be used in refutational defenses. However, McCroskey cautioned that because of the study's design, his results could only be generalized to the typical public confrontation.

McCroskey, Young and Scott (1972) predicted that subjects in a small group communication would be less influenced by counterpersuasion if previously exposed to a two-sided refutational message rather than a one-sided message. This prediction was strongly confirmed. However, their second prediction, that subjects would be less influenced by counterpersuasion in a small group communication setting if the defense included evidence, was not supported. This is in contrast to McCroskey's (1970) findings with public speeches. McCroskey, Young and Scott (1973) conclude:
... inclusion of evidence by an initial communicator when his receiver will be confronted by counterpersuasion in a small group communication setting may have less value or no value at all (p. 211).

Burgoon and King (1974), using a campus-oriented topic rather than health truisms, found that having subjects actively encode a highly intense counterattitudinal message results in attitude change whether or not the subjects were previously inoculated.

Burgoon and Chase (1973) manipulated language intensity levels. Language intensity was operationalized according to Jones and Thurstone's (1955) scales which quantify the degree to which language deviates from neutrality. The authors found a positive relationship between intensity and resistance to persuasion for the supportive pretreatment. They also found the refutational pretreatment to be the most effective against a moderately intense attack when it was presented with a moderately intense language. According to Burgoon and Chase (1973), these findings:

indicate that both supportive and refutational message strategies can be useful in conferring resistance to persuasion. ... language intensity of both pretreatment and persuasive appeal was shown to be a mediating variable in the amount of induced resistance to change. (p. 6)

Infante (1975) studied effects of using opinionated language in conferring resistance to persuasion. He found evidence which:
suggests that the inclusion of non-opinionated language in a message that is attitudinally congruent with receivers reduces the persuasiveness of a prior or subsequent counterattitudinal message, while opinionated language in such a "pro" message does not reduce the impact of a "con" speech. (p. 118)

These results did not quite reach conventional significance levels, however, Infante predicts they would if more opinionated or non-opinionated phrases were included. In the "pro" speech, only 40 of 740 words were opinionated.

In a study closely related to the present one, Cronen and LaFleur (1977) examined alternative explanations for the success of refutational defenses in inducing resistance to persuasion. Cronen and LaFleur concluded: "No support was found for hypotheses derived from McGuire's position" (1977, p. 255). However, their derivations were the very reasons why McGuire's position was not supported. In attempting to apply McGuire's "inoculation theory" to another theory involving "cognitive complexity," Cronen and LaFleur seem to have confounded their test of McGuire's rationale.

Cronen and LaFleur hypothesized on what they viewed as the basis of McGuire's position, that subjects pretreated with refutation defenses would exhibit increased cognitive differentiation and greater overall cognitive complexity than subjects not pretreated. In other words, the authors expected pretreated subjects, in essay type responses, to include more pro and con arguments other than those used in the defense
messages, and to give responses showing a "sensitivity to alternative reasons for differences and similarities among positions, and include relational linkages among various points of view" (1977, p. 261). There are several problems with this method of assessing the motivational properties of the refutational defense. First, McGuire would not necessarily predict an increase in overall cognitive complexity or cognitive differentiation. Instead, McGuire would predict that subjects pretreated with refutation defenses would be motivated to think up more favorable material and therefore be able to list more pro arguments, but not necessarily pro and con. Secondly, McGuire required subjects to list the arguments, not include them in essay responses. Finally, McGuire would not necessarily predict that "inoculated" subjects would increase their ability to establish "relational linkages" or express "sensitivity to alternative reasons." While Cronen and LaFleur may have measured the effects of refutational defenses on a receiver's ability to see the complexity of both sides of the issue, they did not report on the central issue which they claimed to be studying. More specifically, McGuire believes that exposure to a refutational defense threatens a subject's belief. This threat motivates subjects to self belief-bolstering material. Whether it also causes subjects to view all sides of the issue with greater complexity is quite another issue.
Perhaps the most provocative recent research has been done by Pryor and Steinfatt (1978). Using non-truism topics, they found the supportive beliefs do confer significant resistance to persuasion. Pryor and Steinfatt's results were in line with Burgoon and Chase (1973). Contrary to McGuire (1962), they found no significant reduction in resistance over time for supportive or refutational-same defenses.

Pryor and Steinfatt (1978) also state that McGuire's interpretation of the biological analogy for the inoculation is wrong:

In the biological case, the requirement for an inoculation to be more effective than supportive therapy is "not" that the organism must have been in a germ-free environment but only that the organism must have remained free from the "particular attacking virus" in question . . . there are no cultural truisms, no totally unattacked organs. (p. 219)

Pryor and Steinfatt suggest the inoculation theory is not limited to cultural truisms, but is restricted to arguments with which individuals have had little contact.

In addition, Pryor and Steinfatt discuss two methods of operationalizing resistance to persuasion. The way McGuire describes resistance is labeled "incomplete resistance" or "Type II" resistance; it occurs when a defense-attack sequence produces a belief level which is significantly above the attack-only (AO) level (Example follows).
The authors label this "incomplete resistance", since 10.32 is still a significant reduction from the initial level of 13.26.

Pryor and Steinfatt suggest a more stringent way to operationalize resistance to persuasion. "Complete" or "Type I" resistance occurs when a defense-attack sequence produces a belief level which is significantly above the attack-only level and not significantly below the initial level (Example below).

\[
\begin{array}{c}
\text{NN - 13.26} \\
\text{RS-attack - 10.32} \\
\text{AO - 6.64}
\end{array}
\]

They label this "complete" resistance, since the 13.15 is significantly above the 6.64 and also not significantly below 13.26.

Pryor and Lander (Note 1) operationalized resistance to persuasion in this same manner while investigating restoration of beliefs. They found that a belief can be successfully restored after being modified, but not converted to a disbelief, within a full seven days. In fact, the seven-day delay restoration condition achieved "Type I" resistance. However, when the belief was strongly attacked and converted to a disbelief, two-day delay
restoration achieved "Type I" resistance, but seven-day delay restoration was not successful in achieving even "Type II" resistance. It is reasoned that the seven-day interval allows the subject sufficient time to obtain substantial justification for the new belief. Pryor and Lander (Note 1) conclude:

... that successful restoration of a belief which has been significantly modified is contingent upon at least two factors: (1) the extent of the initial modification, and (2) the promptness of the attempted restoration.

The authors go on to reason that restoration of beliefs is analogous to resuscitation in the medical sense:

The success of resuscitating victims of heart attack, choking, drowning, poisoning, etc., is largely contingent upon the same two factors that mediate the effects of attempted belief restoration, the severity of the "attack" and the promptness of countermeasure application. (Note 1)

Great interest in inoculation theory has been expressed in the fields of marketing and advertising. Both laboratory research (Faison, 1961) and field research (Haskins, 1968) has demonstrated that two-sided advertising appeals can be effective. However, Sawyer (1973) identified certain instances when directly referring to a competitor did appear to help the competitor.

Although many well-controlled investigations involving inoculation theory have been conducted, only Papageorgis and McGuire (1961) and Cronen and LaFleur (1977) have attempted to measure the "motivation mechanism" apparently found in the refutational defense. As discussed, McGuire failed to obtain
support for the motivational impact of his refutational defense, while Cronen and LaFleur used a questionable operationalization of motivation. In summarizing his results, McGuire (1964) stated that:

although there was a slight tendency for the subjects who had received the refutational defense to think up more supportive arguments than those who had received no defense the difference was not significant. (p. 209)

The purpose of the current experiment is to retest the motivational effects of the refutational defense under conditions somewhat different than those used by McGuire. It will be recalled that McGuire attempted to assess motivation by comparing arguments listed by two groups of subjects. One group had received the refutational defense and one, the control group, had not. However, approximately half the control group subjects had received an attack message, which may in itself have motivated subjects to seek belief-bolstering material. The current study will provide a purer test of the motivational effects of the refutational defense by using a control group which has been exposed to no relevant messages. The following rationale and predictions are all contingent upon use of issues on which subjects hold extreme beliefs.

Due to the threatening material contained in the refutational defense, the subject perceives a threat to his extremely held belief and therefore is motivated to acquire
arguments in favor of his side of the issue.

H1a: Immediately following exposure to the message, subjects pretreated with a refutational defense will list significantly more belief-congruent arguments than subjects pretreated with a supportive defense.

H1b: Immediately following exposure to the message, subjects pretreated with a refutational defense will list significantly more belief-congruent arguments than subjects in the control condition.

Due to the lack of threatening material in the supportive defense, not much difference, if any, is expected between the supportive and control conditions.

H2: In the immediate measurement, a non-significant difference between the number of arguments listed by subjects in the supportive condition and control condition is expected.

Based on the same rationale, after two days, the delayed measurement should produce results with the same characteristics as the immediate measurement.

H3a: In the delayed measurement, subjects pretreated with a refutational defense will list significantly more belief-congruent arguments than subjects pretreated with a supportive defense.
H3b: In the delayed measurement, subjects pretreated with a refutational defense will list significantly more belief-congruent arguments than subjects in the control condition.

H4: In the delayed measurement, a non-significant difference between the number of arguments listed by subjects in the supportive condition and control condition is expected.

If McGuire is correct in his reasoning, then after two days, subjects pretreated with the refutational defense would have sought and found additional belief-bolstering material. Therefore, those subjects will list even more arguments than they were able to list in the immediate measurement.

H5: Subjects pretreated with a refutational defense will list significantly more belief-congruent arguments in the delayed measurement than in the immediate measurement.
METHOD

Subjects

A total of 78 Valencia Community College and University of Central Florida students who were enrolled in basic communication courses during the fall term of 1981 served as subjects. Five classes, ranging in size from 15 to 18 students, were used to complete the data collection. Students within each class were randomly assigned to either the supportive, refutational, attack or control condition. All treatments were administered simultaneously at each session.

Design

The experiment involved three independent variables, including four message treatments (refutational, supportive, attack-only, and control), two issues (toothbrushing and penicillin) and two intervals between message exposure and administration of the dependent measure (immediate and two-day delay). The dependent variable, motivation to build belief-bolstering arguments, was operationalized as the number of supportive arguments a subject could list following exposure to the treatment. Each subject provided data for one message treatment across both issues and time intervals.
Materials

Each subject received a test booklet in each session. In Session 1, for the subjects in the supportive and refutational defense conditions, the test booklet contained two parts. Part One consisted of two defensive messages, each on a separate page and approximately 500 to 550 words in length. Part Two contained one page with an issue written at the top and at the middle of the page with space underneath each to allow subjects to list favorable arguments about the issues. For the subjects in the attack and control conditions, the test booklet also contained two parts. Part One consisted of two attacking messages for the attack condition and two "filler" messages for the control condition, with each message about 500 to 550 words in length. Part Two was the same as in the refutational and supportive conditions. In Session 2, subjects in all conditions received a test booklet consisting of one page. At the top and at the middle of the page an issue was printed with space underneath each for subjects to list favorable arguments about the issues separately. Two messages were used to enhance external validity.

A pretest was conducted to identify appropriate issues. Selection was based on two criteria: smallest standard deviation and highest belief level. McGuire's 15-point scale was used to measure belief levels (Example follows).
Most forms of mental illness are not contagious.

The two issues selected were: (1) "The effects of penicillin have been almost without exception, of great benefit to mankind"; and (2) "Everybody should brush his teeth after every meal if at all possible." The former received a mean belief level of 13.71 and a standard deviation of 1.86. The latter issue received a mean belief level of 12.58 and a standard deviation of 2.94.

As in McGuire's work, the supportive defense consisted of a statement about an issue, followed first by a paragraph containing two supportive arguments, then by two paragraphs, each developing one of the arguments. The refutational defense consisted of a statement about an issue, followed first by a paragraph containing two weak arguments against the statement, then by two paragraphs, each refuting one of the arguments. Attacking messages consisted of three paragraphs, the first making two statements counter to the position advocated in the defensive message, followed by two paragraphs, each developing one of the counterarguments. The "filler" essays used in the control condition were developed in the same manner; however, the essays dealt with non-relevant issues. All messages and questionnaire items were the same as those used by McGuire (McGuire & Papageorgis, 1961). These materials are included
in the appendix.

Administration

In the first session, subjects in the defense and attack conditions were required to read messages about two issues and then to list favorable arguments about the issue. Subjects in the control condition were required to read "filler" messages and then to list favorable arguments about the two experimentally crucial issues. All booklets were randomly distributed by their class instructor during regular class meetings. Subjects were told that the "essays had been prepared by a research team at the Institute for Social Research and are designed to test reading skills. The Communication Department has agreed to assist in evaluating the validity of this test." Subjects were then instructed to read each paragraph, then go back and underline its crucial clause. Twelve minutes were allotted to read the two 500 to 550 word messages and an additional fifteen minutes to list favorable arguments. Subjects were also instructed to at no time turn back to a previous page.

In the second session, subjects in all conditions were simply asked to read the issue at the top and at the middle of the page and then to list any favorable arguments that came to mind. The same instructor conducted both sessions for all conditions. After the second session, all subjects were completely debriefed.
RESULTS

Separate 2 (issues) X 4 (treatments) ANOVAS with repeated measures on the issue factor were used to test predictions for the immediate and delayed conditions. Issue was treated as a variable, since the scores derived for the two issues were quite dissimilar. The ANOVA for the conditions in which subjects listed arguments immediately following exposure to the message is summarized in Table 1.

Table 1
ANOVA Summary Table on Immediate Condition

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>30.23</td>
<td>3</td>
<td>10.08</td>
<td>6.77**</td>
</tr>
<tr>
<td>Error</td>
<td>110.11</td>
<td>74</td>
<td>1.49</td>
<td></td>
</tr>
<tr>
<td>Topic</td>
<td>8.78</td>
<td>1</td>
<td>8.78</td>
<td>18.29**</td>
</tr>
<tr>
<td>Interaction</td>
<td>4.22</td>
<td>3</td>
<td>1.41</td>
<td>2.94*</td>
</tr>
<tr>
<td>Error</td>
<td>32.50</td>
<td>74</td>
<td>0.48</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05 (3, 74) = 2.75

**p < .01 (3, 74) = 4.13
As can be seen, all three F-ratios were statistically significant. These F-ratios were probed with a series of t-tests for all contrasts relevant to the predictions. Table 2 provides a matrix of all t-test contrasts.

Table 2
Summary of t-test Ratios on Immediate Condition

<table>
<thead>
<tr>
<th>Treatment/Issue</th>
<th>RP</th>
<th>RT</th>
<th>SP</th>
<th>ST</th>
<th>CP</th>
<th>CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refutation/Pen.</td>
<td>--</td>
<td>--</td>
<td>1.12</td>
<td>--</td>
<td>1.95*</td>
<td>--</td>
</tr>
<tr>
<td>Refutation/Tooth</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-0.12</td>
<td>--</td>
<td>-1.05</td>
</tr>
<tr>
<td>Supportive/Pen.</td>
<td>1.12</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.19</td>
<td>--</td>
</tr>
<tr>
<td>Supportive/Tooth</td>
<td>--</td>
<td>-0.12</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-1.31</td>
</tr>
<tr>
<td>Control/Pen.</td>
<td>1.95*</td>
<td>--</td>
<td>1.19</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Control/Tooth</td>
<td>--</td>
<td>-1.05</td>
<td>--</td>
<td>-1.31</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*p<.05

Hypothesis 1a predicted that immediately following exposure to the message, subjects pretreated with a refutational defense would list significantly more belief-congruent arguments than subjects pretreated with a supportive defense. Based on the data in Table 2, hypothesis 1a did not receive support; that is, subjects pretreated with a refutational defense would not list...
significantly more belief-congruent arguments than subjects pretreated with a supportive defense. In fact, on the toothbrushing issue, subjects pretreated with a supportive defense listed slightly more arguments than subjects pretreated with a refutational defense ($p < .46$).

Hypothesis 1b predicted that immediately following exposure to the message, subjects pretreated with a refutational defense would list significantly more belief-congruent arguments than subjects in the control condition. The results in Table 2 partially support hypothesis 1b. On the penicillin issue, subjects pretreated with a refutational defense listed a mean of 2.16 arguments, differing significantly from the control subjects who listed a mean of 1.56 arguments ($p < .05$). However, on the toothbrushing issue control subjects listed non-significantly more arguments than subjects pretreated with a refutational defense ($p < .16$).

Hypothesis 2 predicted a non-significant difference between the number of arguments listed by subjects in the supportive and control conditions. Based on the data in Table 2, hypothesis 2 received support on both issues.

A separate ANOVA was conducted for the condition in which subjects listed arguments following a two-day delay after exposure to the message. These results are summarized in Table 3.
As can be seen, two of the three F-ratios were statistically significant. These F-ratios were probed with a series of t-tests for all contrasts relevant to the predictions. Table 4 summarizes these contrasts.

Table 3
ANOVA Summary Table on Delayed Condition

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>12.74</td>
<td>3</td>
<td>4.25</td>
<td>3.57*</td>
</tr>
<tr>
<td>Error</td>
<td>87.85</td>
<td>74</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Topic</td>
<td>5.77</td>
<td>1</td>
<td>5.77</td>
<td>10.30**</td>
</tr>
<tr>
<td>Interaction</td>
<td>1.90</td>
<td>3</td>
<td>0.63</td>
<td>1.13</td>
</tr>
<tr>
<td>Error</td>
<td>41.33</td>
<td>74</td>
<td>0.56</td>
<td></td>
</tr>
</tbody>
</table>

*P<.05 (3, 74) = 2.75
**P<.01 (3, 74) = 4.13
### Table 4
Summary of t-test Ratios on Delayed Condition

<table>
<thead>
<tr>
<th>Treatment/Issue</th>
<th>RP</th>
<th>RT</th>
<th>SP</th>
<th>ST</th>
<th>CP</th>
<th>CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refutation/Pen.</td>
<td>--</td>
<td>--</td>
<td>0.22</td>
<td>--</td>
<td>2.22*</td>
<td>--</td>
</tr>
<tr>
<td>Refutation/Tooth</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.68</td>
<td>--</td>
<td>0.91</td>
</tr>
<tr>
<td>Supportive/Pen.</td>
<td>0.22</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>2.96*</td>
<td>--</td>
</tr>
<tr>
<td>Supportive/Tooth</td>
<td>--</td>
<td>0.68</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.47</td>
</tr>
<tr>
<td>Control/Pen.</td>
<td>2.22*</td>
<td>--</td>
<td>2.96**</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Control/Tooth</td>
<td>--</td>
<td>0.91</td>
<td>--</td>
<td>0.47</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*p < .05
**p < .01

Hypothesis 3a predicted that in the delayed measurement, subjects pretreated with a refutational defense would list significantly more belief-congruent arguments than subjects pretreated with a supportive defense. The results in Table 4 do not support hypothesis 3a.

Hypothesis 3b predicted that in the delayed measurement, subjects pretreated with a refutational defense would list significantly more belief-congruent arguments than subjects in the control condition. Based on the data in Table 4, hypothesis 3b received partial support. On the penicillin
issue, subjects pretreated with a refutational defense listed a mean of 2.26 arguments, differing significantly from the control subjects who listed a mean of 1.61 arguments ($p < .05$). However, on the toothbrushing issue, the refutational condition listed a mean of 2.58 arguments, which did not differ significantly from the control condition mean of 2.22 arguments ($p < .19$).

Hypothesis 4 predicted a non-significant difference between the number of arguments generated by subjects in the supportive and control conditions. The results in Table 4 partially support hypothesis 4. On the toothbrushing issue, subjects in both conditions listed approximately the same number of belief-congruent arguments. However, on the penicillin issue, subjects pretreated with a supportive defense listed a mean of 2.20 arguments which differs significantly from the control condition mean of 1.61 arguments ($p < .01$).

Hypothesis 5 predicted that subjects pretreated with a refutational defense would list significantly more belief-congruent arguments in the delayed measurement than in the immediate measurement. Hypothesis 5 received partial support. On the toothbrushing issue, refutational subjects listed a mean of 2.21 arguments in the immediate measurement and a mean of 2.58 arguments in the delayed measurement. These means differ significantly ($p < .05$). However, on the penicillin issue, a significant difference was not found. In the immediate measurement, they listed a mean of 2.26 arguments ($p < .29$).
DISCUSSION

Prior research has confirmed the refutational defense as a successful inhibitor of resistance to persuasion. However, the possibility of a "motivation mechanism" in the refutational defense has not been clearly supported. A critical variable in the present experiment was the issue. The data seem to indicate that the motivational component of the refutational defense is issue specific. On certain extremely held beliefs where there are obvious supportive arguments, extrinsic motivation may not be required for a person to build defensive material. For example, in the present study, the toothbrushing issue received many obvious supportive arguments such as "fresher breath" and "whiter teeth." Whereas on the penicillin issue, fewer obvious supportive arguments are known, and motivation may have played a more central role in the subjects' ability to list belief-congruent arguments.

Hypothesis 1a predicted that immediately following exposure to the message, subjects pretreated with a refutational defense would list significantly more belief-congruent arguments than subjects pretreated with a supportive defense. This hypothesis was not supported by the data. On the penicillin issue, subjects pretreated with a refutational defense listed a mean of 2.16 arguments, while the subjects pretreated with a supportive
defense listed a mean of 1.85 arguments. These means do not differ significantly ($p < .14$); however, the findings are in the predicted direction. This current data is similar to that found by Papageorgis and McGuire (1961), who also reported a non-significant difference on this comparison ($p < .20$). On the toothbrushing issue, where motivation perhaps did not pertain, subjects pretreated with a supportive defense listed slightly more belief-congruent arguments than the subjects pretreated with a refutational defense ($p < .46$).

Hypothesis $1_b$ predicted that immediately following exposure to the message, subjects pretreated with a refutational defense would list significantly more belief-congruent arguments than subjects in the control condition. This hypothesis received partial support. Once again, the findings seem to indicate issue specificity in relation to the presence of a "motivation mechanism" in the refutational defense. On the penicillin issue, subjects in the refutational condition listed a mean of 2.16 arguments, differing significantly from the control subjects who listed a mean of 1.56 arguments ($p < .05$). This finding directly supports McGuire's contention that the refutational defense threatens one's belief, thereby motivating the individual to seek belief-supporting cognitions. However, on the toothbrushing issue, with perhaps more obvious supportive arguments known, the control subjects listed non-significantly
more arguments than subjects pretreated with a refutational defense ($p < .16$).

Hypothesis 2 predicted a non-significant difference between the number of arguments listed by subjects in the supportive and control conditions. This hypothesis received support on both issues. This finding directly supports McGuire's reasoning that the element of threat to one's belief is required for motivation to take place. Since neither the supportive nor control conditions threaten the receiver's belief, motivation to build defensive arguments should be equal.

Hypothesis 3a predicted that in the delayed measurement, subjects pretreated with a refutational defense would list significantly more belief-congruent arguments than subjects pretreated with a supportive defense. This hypothesis was not supported; however, the findings were in the predicted direction. On the toothbrushing issue, subjects pretreated with a refutational defense listed a mean of 2.58 arguments, while the subjects pretreated with a supportive defense listed a mean of 2.35 arguments ($p < .26$). Once again, the obvious supportive arguments on the issue may have mitigated against a significant difference between the means. On the penicillin issue, subjects in the refutational condition listed a mean of 2.26 arguments, while subjects in the supportive condition
listed a mean of 2.20 arguments \( (p < .42) \). The difference between these means is trivial and is due to the fact that subjects in the supportive condition listed significantly more arguments on the penicillin issue in the delayed measurement than they were able to list in the immediate measurement \( (p < .05) \). This finding is in direct contrast to McGuire's rationale that the supportive defense loses effectiveness with the passage of time and cannot be adequately explained. A speculated reason for this finding could be selection bias. The subjects were selected from two college campuses: Valencia Community College and the University of Central Florida. There is a possibility that students from one campus are more astute than their counterparts; and, therefore, if more of these perspicacious students were pretreated with a supportive defense, their ability to generate favorable arguments could contribute to differences between treatments. However, this speculation must be ruled out, since an equal number of subjects from each campus received each pretreatment.

A second, perhaps more pertinent speculation, might be that the finding occurred by chance. All contrasts of means were conducted using the .05 level of significance. This should result in one type II error, not rejecting the null when it should be rejected, for every 20 contrasts. Since the present experiment involved the use of 32 such contrasts,
approximately 1.6 of these contrasts would be expected to produce significance by chance. Replication of the appropriate treatments is needed to clarify the role of time delay in the generation of belief supporting arguments following exposure to the supportive defense.

Hypothesis 3 predicted that in the delayed measurement, subjects pretreated with a refutational defense would list significantly more belief-congruent arguments than subjects in the control condition. This hypothesis received partial support. Again, issue specificity seems to be apparent. On the penicillin issue, subjects pretreated with a refutational defense listed a mean of 2.26 arguments, differing significantly from the control subjects, who listed a mean of 1.61 arguments ($p < .05$). This finding enhances McGuire's reasoning of the presence of a "motivation mechanism" in the refutational defense. Concerning the toothbrushing issue, the findings are in the predicted direction; however, the difference is not significant. Here, subjects in the refutational condition listed a mean of 2.58 arguments, and the control group subjects listed a mean of 2.22 arguments ($p < .19$).

Hypothesis 4 predicted a non-significant difference between the number of arguments generated by subjects in the supportive and control conditions. This hypothesis received partial support. On the toothbrushing issue, subjects in both conditions
listed approximately the same number of belief-congruent arguments. However, on the penicillin issue, subjects pretreated with a supportive defense listed significantly more belief-congruent arguments than subjects in the control condition (p < .01). Again, this occurred because subjects in the supportive condition were able to significantly increase the amount of arguments they could generate two days later.

Hypothesis 5 predicted that subjects who received the refutational defense would generate significantly more belief-congruent arguments in the delayed measurement than in the immediate measurement. This hypothesis received partial support. On the toothbrushing issue, subjects in the refutational condition were able to list significantly more arguments in the delayed measurement than in the immediate measurement (p < .05). As will be recalled, subjects receiving the toothbrushing issue in the immediate measurement listed approximately the same number of arguments regardless of the defense type. However, subjects pretreated with a refutational defense were capable of generating significantly more arguments in the delayed measurement than in the immediate measurement. This increase suggests that the subjects were motivated by the refutational defense to bolster their beliefs. This reasoning is consistent with
McGuire's rationale that the subject perceives a threat to his belief and is therefore motivated to think up material in favor of his side of the issue.

**Issue Specificity**

The data from the present experiment suggests a more complex relationship than McGuire postulated regarding the role of the refutational defense in motivating subjects to think up belief-bolstering material. Based upon the data, one might reason as follows: The "motivation mechanism" seems to be apparent only with certain issues. These issues are extremely held beliefs in which few obvious supportive arguments are known, such as the penicillin issue. These types of beliefs are contrasted by extremely held beliefs in which numerous obvious supportive arguments are known, such as the toothbrushing issue.

If this experiment involved only the penicillin issue, the data would have indicated strong support for McGuire's rationale. However, had only the toothbrushing issue been used, the data would have indicated little support for McGuire's rationale. Based on these findings, one might predict that the motivational component of the refutational defense is relevant only to issues for which subjects have little or no information. In this way, they have something to gain from the threat and consequent motivation to build counterarguments should occur. This rationale
offers an explanation for the findings of Papageorgis and McGuire (1961). These authors reported a non-significant difference between the mean number of arguments listed by subjects pretreated with a refutational defense and those listed by subjects not pretreated with a refutational defense ($p < .20$). The two issues used in that study were the toothbrushing issue along with "Everybody should get a chest x-ray each year in order to detect any possible tuberculosis symptoms at an early stage". Contrary to the present experiment, the authors combined the data before analysis. Therefore, the "issue specificity" of the "motivation mechanism" was not apparent. Had Papageorgis and McGuire analyzed the data separately for each issue, the findings may have supported McGuire's contention of a "motivation mechanism" on the x-ray issue, where few obvious supportive arguments are known. On the other hand, the "motivation mechanism" rationale probably would not have been supported on the toothbrushing issue due to the many obvious supportive arguments. The "issue specificity" finding in the current experiment is the direct result of treating $X$ (the independent variable) in more than one way. As pointed out by Campbell and Stanley (1977), this enhances explanatory power and external validity of research findings. Further research is needed to explore the proposed "issue specificity" rationale.
Internal Validity

In the interest of objective analysis, it will be useful to discuss potential threats to the internal validity of the experiment. As discussed earlier, selection bias was alleviated by conducting all treatments simultaneously within each measurement time. Further, approximately equal numbers of University of Central Florida and Valencia Community College students provided data for each condition. In addition, all subjects seemed comfortable with the amount of time allotted to read the messages and list the arguments. A control condition was included to measure any possible external influences on the subjects. One potential threat to the validity of the present experiment is the amount of space subjects were apportioned to list the arguments. Although the subjects did not comment on this, there may have been a tendency for subjects to stop listing arguments when they reached the bottom of the page. Whether this was present and if it affected one condition more than another cannot be determined. Since no subjects used the back of the page to write arguments, this possibility should be considered in replication.

It is of paramount importance that future research deal with McGuire's contention of a "motivation mechanism" in the refutational defense and also the contention of "issue specificity". Future experiments should deal with issues
about which relatively few obvious supportive arguments are known, such as the penicillin issue. Another important area to be probed is replication using non-truisms. Perhaps, the "motivation mechanism" is apparent on issues that are not extremely held beliefs and few obvious supportive arguments are known. One more interesting research direction is the possibility of developing alternative methods of measuring motivation. Instead of requiring subjects to list belief-congruent arguments, perhaps a self-reporting instrument could be developed. Conceivably, this instrument could take the form of a questionnaire, administered two days after treatment, inquiring whether the subjects discussed the issue or if they were compelled to seek information in support of their belief.

Conclusions

Papageorgis and McGuire (1961) hypothesized two reasons for the effectiveness of the refutational defense as an inhibitor of resistance to persuasion. First, they suggested that after subjects had seen counterarguments effectively refuted, any future counterarguments would be perceived as less impressive. This hypothesis received support beyond the .01 level. Secondly, the authors hypothesized that a person's pre-exposure experience may motivate him to seek belief-bolstering material and therefore generate more belief-congruent
arguments than subjects not pretreated with a refutational defense. Papageorgis and McGuire failed to obtain support for this hypothesis (p < .20). However, as discussed in the present experiment, "issue specificity" may have been a relevant, but uncontrolled, variable in this previous research. On extremely held beliefs with few obvious supportive arguments known, the "motivation mechanism" may play a central role in developing resistance. Conversely, on extremely held beliefs with numerous obvious supportive arguments known, the "motivation mechanism" may not play a key role in inducing resistance to persuasion. In sum, data from the present experiment suggest that the "motivation mechanism" in the refutational defense is "issue specific". Future investigations which systematically vary issue as a variable are needed to explore the relationship between issue, the defense type, and the generation of belief-supporting arguments.
APPENDIX A
OPINION SURVEY
Opinion Survey

Please respond to each of the following statements by indicating your own personal opinion of the statement's truth. Answer the questions in the order presented, and do not skip any question. Work rapidly, as only three minutes are allowed for answering all questions.

1. Everyone should get a chest X-ray each year in order to detect any possible TB (tuberculosis) symptoms at an early stage.
   / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14 / 15
   Definitely False Probably Uncertain Probably Definitely True True

2. The effects of penicillin have been almost without exception, of great benefit to mankind.
   / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14 / 15
   Definitely False Uncertain Probably Definitely True True

3. Most forms of mental illness are not contagious.
   / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14 / 15
   Definitely False Uncertain Probably Definitely True True

4. Everyone should brush his teeth after every meal if at all possible.
   / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14 / 15
   Definitely False Uncertain Probably Definitely True True

5. There are disadvantages to brushing one's teeth too often as well as too seldom.
   / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14 / 15
   Definitely False Uncertain Probably Definitely True True

6. The benefits to mankind from using penicillin have far outweighed any disadvantages.
   / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14 / 15
   Definitely False Uncertain Probably Definitely True True
7. Everyone should see his doctor at least once a year.

| / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10/ 11/ 12/ 13/ 14/ 15 |
|----------------------|----------------------|----------------------|----------------------|----------------------|
| Definitely False     | Probably False       | Uncertain True       | Probably True        | Definitely True      |

8. The best way to prevent tooth decay is to brush one's teeth frequently.

| / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10/ 11/ 12/ 13/ 14/ 15 |
|----------------------|----------------------|----------------------|----------------------|----------------------|
| Definitely False     | Probably False       | Uncertain True       | Probably True        | Definitely True      |

9. Commodities made in Japan are, for the most part, of low quality.

| / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10/ 11/ 12/ 13/ 14/ 15 |
|----------------------|----------------------|----------------------|----------------------|----------------------|
| Definitely False     | Probably False       | Uncertain True       | Probably True        | Definitely True      |

10. Vehicle malfunctions are a minor contributor to the traffic safety problems in the U.S.

| / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10/ 11/ 12/ 13/ 14/ 15 |
|----------------------|----------------------|----------------------|----------------------|----------------------|
| Definitely False     | Probably False       | Uncertain True       | Probably True        | Definitely True      |
APPENDIX B

READING TEST
The material herein has been prepared by a research team at the Institute for Social Research, and is part of a test designed to measure reading skills. The Communication Department has agreed to assist in evaluating the validity of the test. Consequently, we are asking students to help us. Please follow the instructions below. If you have a question, come to the front of the room and ask it privately. Do not ask it aloud.

Instructions

1. Do not turn this, or any page until asked to do so.

2. When instructed, read the following page at a fairly rapid pace, underlining what you believe to be the crucial clause (or group of words) in each paragraph. You will be given 6 minutes to complete each page. When you finish a page, stop and await further instructions.

3. At no time should you turn back to a previous page.

PLEASE DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.
Medical researchers and physicians are generally agreed that the discovery and use of penicillin has been one of the greatest steps in the history of medicine's long fight against disease and death. It is particularly unfortunate, therefore, that the press has seen fit to print some well-intentioned but misguided stories which attack the use of this miracle of modern science. These stories have harped on the alleged dangers of penicillin when administered to "allergic" patients, or on the idea that penicillin causes the development of stronger breeds of bacteria. Since it is so important that we do not deprive ourselves of the unmatched benefits derived from penicillin treatment, it will pay us to look briefly at these unfortunate attacks on penicillin in order to see the fallacies involved in them.

One of the most distorted arguments against penicillin is that it has produced bad effects on some people who were allergic to penicillin. And while it is true that such detrimental effects have been produced upon allergic patients, it should be noted that such allergies are extremely rare. Further, the detrimental effects were produced in the days when penicillin was just beginning to be used by physicians, and it was not yet recognized that a few rare individuals were allergic to penicillin. Actually, a few people can always be found who are allergic to nearly any substance known. What critics of penicillin frequently fail to mention is that a simple test is available which detects penicillin allergy and, of course, penicillin is no longer given to people who are allergic to it. Initially, the allergy danger of penicillin was very small, but now with the use of this simple test, even this small danger has been eliminated, making penicillin one of the safest drugs to use.

Another example of a misleading and distorted argument against penicillin is that it has caused the development of stronger breeds of bacteria against which penicillin has no apparent effect. This argument goes further to say that after prolonged use of penicillin, the patient becomes "adapted" to it and penicillin no longer can be used for that patient. It is true that when any drug is used on a patient over a prolonged period of time, the effect of that drug will not be as great as it was originally. To a very minor extent, this is also true of penicillin. However, one of penicillin's greatest advantages is that it remains effective with continued use for a far greater period of time than does almost any other known drug. As for the claim that penicillin has produced stronger, more virile strains of bacteria, one should recognize immediately the fact that since the beginning of time, organisms have tended to develop strains which survive better under changing conditions. To argue that penicillin is the cause for the development of these stronger strains is an unwarranted and unsubstantiated statement. While we should realize that penicillin is not perfect, that it does not kill all germs, we should also realize that it is the nearest approach we have so far made to a perfect answer to all medical problems.
Some False Charges Against Tooth Brushing Practices

We are, no doubt, all aware that one should brush his teeth after every meal. Yet, from time to time, stories by well-intentioned but misguided reporters are published claiming that this healthful practice is unwise. Often these stories seem on hasty examination to be reasonable, but a closer look shows us that they are based on distortions of the facts and are misleading. While no one would claim that brushing one’s teeth after every meal will positively prevent tooth decay, it is easy to demonstrate by scientific facts and figures that this practice does reduce the amount of decay and that the practice is in general a very important health measure. Because brushing one’s teeth after every meal is so important, and because these distorted arguments against the practice may sometimes sound convincing on the basis of a brief reading, it will be useful to review here some of these misleading arguments against frequent tooth brushing and to show where their errors lie.

Many times the opponents of tooth brushing will quote incomplete and unreliable statistics which indicate that groups who brush their teeth frequently have a higher incidence of tooth decay than those who do little or no brushing. This, to say the least, is a misleading statement based on a statistical fallacy. If we go to the source of such statements we shall find that they rely on comparisons of western populations with small primitive societies or between high and low income groups in our own population. It is true that people in these primitive cultures have less tooth decay than we do, but it would be foolish indeed to say that this is so because we happen to brush our teeth. The poor teeth in civilized, advanced societies and especially in high income groups are due, not to tooth brushing, but to our richer diet that contains large components of citrus fruits, sugars and other substances that cause tooth decay. The brushing is not a cause of our high rate of tooth decay but is, in fact, a necessary corrective measure for this decay-causing diet. It is only by means of dental hygiene, especially brushing the teeth, that we prevent our rich diet from causing even more decay than it does.

Another faulty argument that one sometimes hears is the claim that tooth decay occurs mostly while the food is in the mouth and that, therefore, brushing the teeth after the meal fights decay when it is already too late to do much good. Even though tooth decay does occur mainly while the food is in the mouth, we must recognize that when the meal is over many food particles remain in the mouth lodged between the teeth for long periods after the meal unless they are removed by brushing. This, in fact, is why it is so important to brush our teeth after each meal. Hence, while it is true that decay occurs for the most part while food is in the mouth, this fact is a good reason for, rather than against, frequent tooth brushing. When we fail to brush our teeth after each meal food particles remain in our mouths indefinitely with the result that tooth decay occurs continuously. It is important that such misleading arguments as those which we saw here do not cause us to neglect the simple and highly effective health practice of brushing our teeth after every meal.
Penicillin: The Miracle Drug

Medical authorities are generally agreed that one of man's greatest steps in the fight against disease and death was achieved in this century by the discovery and use of penicillin. Innumerable benefits have been derived from the use of this now indispensable drug. Penicillin has been proved to be quite inexpensive and readily available to all who need it. Furthermore, penicillin has provided a great convenience for patients, since in many cases they need not remain hospitalized during treatment with penicillin. Because penicillin treatment is so important in the great recent advances in medicine, it will be useful to consider in a little more detail some of these benefits it has conferred on mankind in the fight against disease.

Besides being a very effective treatment in combating disease, penicillin is usually also the least expensive treatment. It is mass produced in high quality, high potency batches at an amazingly low cost. Furthermore, the administration of penicillin is much cheaper than treatment by any other means. For example, a case of blood poisoning, before the use of penicillin in treatment, required a long period of hospitalization and much costly medication. The total cost of this to the patient was about $2,700. (And many victims of blood poisoning could not be cured at all before the advent of penicillin.) Today, through the use of penicillin, the cost of treating a patient for blood poisoning has dropped to approximately $24 (and it is almost always successful). Similarly, impressive savings occur in the treatment of pneumonia, peritonitis, etc. It is this low cost, combined with its general effectiveness, that has made penicillin so useful. Its advantages are available to all people regardless of their economic status or the availability of expensive hospital care.

Still another benefit of penicillin is its convenience for the patient himself. In many cases it is no longer necessary to treat a person suffering from infection by long and costly hospital care that takes him away from his home, family, and occupation, and which is often followed by a prolonged confinement to bed during convalescence at home. Now, by means of penicillin treatment, frequently all the patient need do is pay a short visit to his doctor's office, after which he is able to carry on his duties at home and on his job. Furthermore, the patient today is often spared painful and dangerous treatments (such as major surgery) for many illnesses now that safe and painless treatment by penicillin is available.
The Benefits of Brushing Teeth After Every Meal

Even though we all recognize the wisdom of brushing our teeth after every meal, the practice is so important that it is worthwhile to review some of the reasons for carrying out this valuable health measure. Naturally, tooth brushing improves the appearance of our teeth, something that is desirable in itself. More important, science has demonstrated many health benefits deriving from brushing our teeth.

Tooth brushing provides the best means we have of eliminating decay-causing bacteria which can destroy both teeth and gums. Such decay-preventing measures have become especially important nowadays when our changing food habits are tending to increase the likelihood of tooth decay. Let us look briefly into some of the reasons why brushing one's teeth after every meal is so important.

It has been known for a long time that the major cause of tooth decay (dental caries) is a general class of oral bacteria which are commonly known as "decay bacteria." A certain amount of these bacteria which attack and damage teeth and gums are found in the human mouth at all times. Brushing one's teeth tends to remove these bacteria both mechanically and chemically. Several dental schools in this country and abroad have conducted experiments in which they have measured the number of bacteria present in the mouths of people who brushed their teeth after every meal and those who did not. It was found that approximately 78% of the decay bacteria were eliminated after each brushing. (Since the remaining bacteria multiply very rapidly between and during meals, it is important to brush one's teeth again after each meal.) It was also found that regular tooth brushing reduces the decay by as much as 70% below what it is with only occasional brushings. Thus, by killing these decay bacteria brushing one's teeth after every meal considerably reduces tooth decay.

While brushing one's teeth after every meal has always been a recommended health practice, it has become more important than ever today because of changes in our eating habits. In this country, we are now eating a richer diet than ever before. Each year, we find a large increase in the per person consumption of such foods as fruit juices, soft drinks, cakes, candies, etc., which are the very foods which are most likely to cause tooth decay. Furthermore, there is an increasing tendency to eat between meals: the coffee break, the coke break, the after-the-movie soda, and the TV or bedtime snack are becoming more and more popular. This between-meal food intake notably increases the possibility of tooth decay. Hence, to counteract these dietary trends that threaten to make the tooth decay problem even greater than before, it has become increasingly important that we take the most effective counter-measure against decay, namely, brushing our teeth after every meal.
The Importance of An Annual Visit To Your Doctor

We would all probably agree that it is a wise policy to visit our physician annually for a health examination, even when there is nothing in particular bothering us. In spite of our intellectual agreement with the wisdom of such a policy, there are still many people who fail to make a routine annual visit. In fact, there continues to be people who never visit their physician until some particular symptom bothers them. Because this matter of visiting one's physician regularly, even in the absence of particular symptoms, is so important, it would be wise to review a few of the basic facts that have led health authorities and physicians to recommend this practice so strongly. For example, only by carrying out this practice can we be sure that we will recognize symptoms of an illness when it is still in its early stages and can be easily cured. Furthermore, the practice allows us to detect illnesses which do not have easily recognized symptoms and thus protects the health not only of the individual, but of the whole community as well. Let us outline the importance of these points in a little more detail so that we may more fully realize the value of this vital health measure.

Only by an annual check-up can we be sure that the individual's illness will be recognized in its early stages when treatment is easier and more sure. It is tragically ironic that some of the worst killers among the diseases that afflict us today start out as conditions which actually can be quite easily and completely cured and which develop into the fatal forms only if allowed to go untreated. For example, many heart diseases (the number one killer of today) start out as fairly simple conditions which are easily detected by a physician but are likely to go quite unnoticed by the layman. Likewise, so-called incurable cancer often starts out as a fairly simple condition which can easily be corrected by prompt medical attention. While professional medical diagnosis can readily detect these early symptoms, they often escape the notice of the sufferer himself, and he is therefore unlikely to bring them to medical attention until symptoms of the more advanced stages of the disease become apparent. A routine annual check-up would, however, assure early detection. This early detection of the symptoms not only prevents their developing into the fatal and incurable forms but also usually allows them to be treated and cured very conveniently and painlessly for the patient.

There are a number of diseases which produce no noticeable symptoms until they reach a very advanced stage and hence, go untreated. The result is that besides the patient's own suffering, the health of those with whom he comes into contact is also endangered. By having a routine check-up, such conditions can be detected early and the patient can take necessary precautions so as to avoid exposing his family and associates to the illness. In any case, his physician will be able to begin treatment and correct the condition thereby protecting the health of both the patient and his associates. Even where the cure cannot be affected immediately, once a medical exam detects the disease, the patient can, on the advice of his physician, take the necessary precautions to protect his family and loved ones with whom he comes into constant contact so that they will not be endangered by his illness. Hence, we see that this recommended practice of seeing our physician once every year for a thorough check-up, even in the absence of any specific symptoms, is a necessary measure not only for our own health but also as a public health measure to avoid damaging the health of our loved ones or of the community in general.
The Importance of an Annual X-Ray Exam for Detecting TB

Great progress through medical research has been made in the past fifty years in the fight to control, detect, and cure TB (tuberculosis). At the turn of the century this disease was the nation's No. 1 killer. In the past few decades, however, TB has been reduced to a minor and well-controlled health problem. The most important single weapon that has made this historic advance possible has been the widespread adoption by the American people of the practice of getting annual chest X-ray examinations, which remains the best way of detecting TB symptoms in their earliest stages. In order to maintain the gains which have been made, the public's continued cooperation in this X-ray campaign is essential. The chest X-ray is the surest way of detecting TB symptoms, thus providing maximum protection from this highly contagious disease, not only for the patient himself but also to his loved ones and others with whom he comes in contact. Furthermore, the annual chest X-ray examination gives assurance that TB will be detected in its earliest stages when the cure is easy, painless, and complete. Let us explore more thoroughly the reasons which make the annual chest X-ray so important for the detection of TB symptoms.

The annual chest X-ray examination is extremely important because it is the only sure way of detecting TB. This disease can seldom be recognized by outward symptoms. People who have TB and have not had chest X-rays, very rarely know it until it is far advanced, because the first outward symptoms are so slight that they are usually either ignored entirely or mistaken for a common cold. However, through the miracle of X-rays, we can get a picture of the patient's lungs that will clearly show any signs of TB. With other methods, TB symptoms may go unnoticed, but when a chest X-ray is used, the symptoms are always detectable. The detection of this disease is a vital necessity not only for the sufferer himself but for his loved ones and associates. TB is a contagious disease and a person who does not realize that he has it will be exposing his family, friends, and others with whom he comes in contact to the danger of getting the disease. Therefore, the annual chest X-ray is extremely important for the patient and for the public at large because only through annual chest X-ray examinations can we be confident that TB symptoms are detected.

One extremely important aspect of the chest X-ray examination is that it can detect the disease in its very early stages, when it is easily cured. Since TB destroys lung tissue, it is extremely important to diagnose and treat it as soon as possible, for the earlier it is discovered, the greater are the chances for a quick and complete recovery. Once the disease is discovered, modern medical treatment can stop further destruction of the lung tissue, but it cannot restore the tissue already damaged before the disease was discovered. The annual chest X-ray assures early detection of the disease when treatment is so simple that in most cases the patient does not even have to be hospitalized. If the disease is not diagnosed until the more obvious symptoms appear and the disease is in the advanced stages, it may be too late to avoid serious and even fatal consequences. Treatment of TB in the late stages takes a long time and is quite expensive. And even if the patient lives, the disease has usually caused so much damage that he is partially incapacitated for life and is exposed to the danger of a later re-occurrence of the disease. On the other hand, if we faithfully carry out the necessary precaution of getting an annual chest X-ray, we can be sure of quick and successful cure and prevent TB from ever again becoming the No. 1 killer in the U. S.
Some Drawbacks Involved in the Use of Penicillin

The discussions of penicillin in the popular press mention repeatedly and exclusively its beneficial effects. A rather different evaluation is seen when we study the discussions of this drug in the professional journals of the medical, biochemical, and pharmaceutical professions. While the beneficial effects of penicillin are not, of course, denied in the professional journals, the scientists who engage in continuing research on its effects are expressing increasing concern over some of this drug's highly undesirable side effects. For example, some people are allergic to penicillin and with its continued use, more are becoming so. Also, its widespread use has resulted in the elimination of weaker strains of bacteria with the resulting production of new and more deadly strains against which it (and other antibiotics) are ineffective. Because the problem is so serious and the use of penicillin so widespread, it will be wise to look into some of these detrimental effects of penicillin in more detail.

One trouble with penicillin is that, as with almost all other powerful pharmaceutical drugs, there are some people who are allergic to it and suffer adverse effects ranging from minor rashes to death when it is administered to them. There are impressive number of cases reported in the medical journals in which injections of penicillin, given for relatively minor infections resulted in the death of the patient who happened to have a serious allergy to penicillin. This allergy problem is particularly serious in the case of penicillin for two reasons. First, it is serious because of its unpredictability. Penicillin allergies are hard to detect and while there are complex tests available, physicians do not as a rule give their patients such tests before administering penicillin. Furthermore, the allergy to this drug (as to many pharmaceutical agents) has the tendency to come and go unpredictably, so that the patient's having been found non-allergic by an earlier test or his having previously taken penicillin with no ill effects is no assurance that the next time he is given this drug he will not suffer unpleasant and even fatal reactions. A second reason why medical scientists and public health officials are becoming worried about penicillin allergies is that they are on the increase. The national medical statistics compiled monthly by the Public Health Service indicate that in the first year of its use, penicillin allergies were extremely rare, but ever since have been increasing at an accelerating rate. One of the theories for this increase is that there is an accumulative effect of penicillin on the system, so that the first few times the person gets the drug he shows no adverse effects, but by the time he has gotten continued treatments during life, enough of the drug accumulates in his system to bring out the latent allergies. The other theory is that the stronger dosages that are being given currently (to combat the more resistant strains of bacteria that have developed) may also account for some of the increase in allergic reactions to penicillin.

The increased reliance on penicillin has produced yet another tragic consequence. Several hospitals in Houston, Detroit, London, and Tokyo have recently reported epidemics of deaths among new-born babies from staphylococcus infections against which penicillin had no effect. And yet penicillin used to be able to fight this particular form of bacteria successfully. Here we see another case of an increasingly serious effect of penicillin. Its use tends to result in the development of more resistant strains of germs, so hardy that neither penicillin nor other drugs are effective against them. Furthermore, since this drug works by stimulating the patient's system to produce antibodies, continual use habits the patient to it, until soon neither penicillin nor other drugs have the required effect when needed. Hence, excessive use of penicillin has resulted in the development of some of the most deadly forms of germs ever known. And, at the same time, it is making it increasingly more difficult to stimulate the patient's system to produce the necessary antibodies to fight such infection. While penicillin obviously has conferred many benefits, one should not overlook that it has had some harmful effects as well.
Some Dangers of Excessive Tooth Brushing

Many people brush their teeth more or less automatically after each meal without realizing that late medical reports have been calling this procedure into question. Recent medical and biological studies indicate that the beneficial effects of constant tooth brushing have been exaggerated. Furthermore it has been demonstrated that a number of bad effects can result from brushing teeth so often. In fact, statistical studies usually show higher rates of tooth decay among those brushing after every meal than among those who seldom or never brush their teeth. Biochemical studies also indicate that most tooth decay occurs while the food is still in one's mouth, so that the brushing comes too late to do much good. Hence, dental authorities are beginning to urge that instead of brushing our teeth so frequently, we take other measures to improve dental health, such as a better diet. Let us review some of this recent evidence demonstrating that constant tooth brushing does not do any great amount of good and can do much harm.

It can be demonstrated by medical statistics that constant tooth brushing after every meal can cause more harm than good as far as dental decay is concerned. Medical statistics show that groups who brush their teeth this frequently tend to suffer from the highest rate of tooth decay. For example, statistical studies show that the rate of tooth decay is higher in the high income, college educated segment of the population -- which does the greatest amount of tooth brushing -- than in the low income segment where this practice is more likely to be neglected. Also when we compare the rate of dental problems in various countries, we find an almost perfect relationship between the amount of dental troubles and the amount of tooth brushing. Toth decay is a disease of the highly civilized societies with the highest level of so-called hygienic tooth brushing and is relatively unknown in primitive societies where the tooth brush is unknown. Indeed it can be shown that in a number of primitive societies that have been "Westernized" during the past half-century, the frequency of tooth decay has actually gone up after the practice of tooth brushing was adopted. Of course, not all people who brush their teeth have dental troubles, but these statistics suggest that, on the whole, constant brushing does our teeth more harm than good.

Furthermore, it has been conclusively shown (Columbia Dental School, 1957) that almost all tooth decay occurs while the food is still in the mouth. By the time the meal is over and one has a chance to brush his teeth, it is already too late for the brushing to do much good. The decay producing activity of the bacteria depends on certain digestive enzymes which are liberated only while food is actually in the mouth. Hence, when we stop eating and these enzymes are no longer secreted, the bacteria can no longer produce decay. Since we do not, of course, brush our teeth until after we have finished eating, this measure is, so to speak, like closing the barn door after the horse has already escaped. It would be wiser to utilize safer and more effective ways of preventing dental disease, such as a better diet or more frequent visits to the dentist. Since tooth brushing after every meal can do so little good and, as we have just seen, has so many harmful effects, it seems unwise to recommend this constant brushing as a general health measure.

PLEASE DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.
APPENDIX C

ISSUE ARGUMENTS
Please list all the arguments that come to mind in favor of the following two issues. Work at a fairly rapid pace, as you have 15 minutes to complete the task.

The effects of penicillin have been almost without exception, of great benefit to mankind.

Everyone should brush his teeth after every meal if at all possible.
REFERENCE LIST


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