On the Processing of Arguments

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ABSTRACT: This paper is concerned with the processing of informal arguments, that is, arguments involving "probable truth." A model of informal argument processing is presented that is based upon Hample's (1977) expansion of Toulmin's (1958) model of argument structure. The model postulates that a claim activates an attitude, the two components forming a complex that in turn activates reasons. Furthermore, the model holds occurrence of the reason, or possibly the claim and the reason, activates values. Three experiments are described that provide support for the model.

KEY WORDS: Argument, argumentation, pro and con reasons, value-based arguments, attitude, social issues, justification, argument processing, informal reasoning, representation.

This paper is concerned with how individuals process informal arguments. By informal arguments we mean arguments that are probabilistic in nature, often involving opinion, arguments concerned with "probable truth" (cf. Voss, Perkins and Segal, 1991). In contrast, formal arguments are taken to be those found in formal logic such as categorical and conditional syllogisms.

The last three to four decades have witnessed an increase of interest in informal arguments, due in part to the rejuvenation of the field of rhetoric (e.g., Perelman and Olbrechts-Tyteca, 1969 (orig. 1958); Toulmin, 1958) and the development of the field of communication (e.g., Arnold and Bowers, 1984). With respect to psychology, there has been a growing interest in informal reasoning, with studies including argumentation by children (e.g. Kuhn, 1991; Stein and Miller, 1991), in mother-daughter relationships (Hofer, Fleischmann and Pikowsky, 1991), in relation to attitude (Billig, 1985; Zammuner, 1987), in decision situations (Perkins, Allen and Hafner, 1983), and in school subject matter (cf. Voss et al., 1991). Despite this growth of interest, however, little research has been conducted on the question of how informal arguments are processed (cf. Hoch, 1984, 1985). The present paper is concerned with this issue, the first of three sections presenting a model of the processing of informal arguments, the second summarizing the results of three experiments generated in relation to the model, and the third presenting some general implications of the research.
HOW IS AN INFORMAL ARGUMENT PROCESSED?

Nature of Argument

As stated by Aristotle (Cooper, 1960; Corbett, 1971), informal arguments typically take the form of an enthymeme, that is, a claim and a supporting reason, as shown in Panel A of Figure 1. While an enthymeme is defined as a syllogism with one premise missing, to consider it only in these terms is misleading (cf. McBurney and Mills, 1951). The important point about the enthymeme is that its soundness does not depend upon making the missing premise explicit and evaluating the particular argument in relation to the rules of the syllogism; instead, soundness is a function of 1) the acceptability or plausibility of the reason per se; 2) the relevance or support that the reason provides for the claim; and 3) the extent to which counterarguments are taken into account (Angell, 1964). Moreover, in evaluating an enthymeme, a person's knowledge, beliefs, attitudes, and/or values have been shown to influence performance (Voss, Engstler-Schooler, Fincher-Kiefer and Ney, 1989).

![Diagram of the minimal components of an argument and of a counterargument.](image)

C = Claim
R₁ = Reason (premise) supporting C
C¹ = Claim that is the contradiction of C
R₂ = Reason (premise) supporting C¹, and opposing C.

Fig. 1. Diagram of the minimal components of an argument and of a counterargument.

The concept of a counterargument requires comment. An informal argument is often regarded as consisting of a claim and supporting (pro) and opposing (contra or con) reasons. But this is an oversimplification. As indicated in Panel B of Figure 1, a counterargument consists of a claim and a supporting reason, with the claim being the contradiction of the initial claim. The supporting reason is then a con reason with respect to the initial claim. This point suggests that
reasons supporting a given claim may be easier to process than opposing reasons because the latter likely involve the intervening step of relating the opposing reason to the contradiction of the initial claim. Evidence for this interpretation is presented in this paper and elsewhere (Voss, Englster-Schooler, Kennet, Wolfe and Sifffes, 1990).

Toulmin (1958) has proposed an argument structure that has additional components. Toulmin's model consists of a datum and a claim, these two components being connected by a warrant, which essentially is the missing premise of the enthymeme. In addition, the model includes backing, that is, information used to support the argument, and qualifier, a statement that restricts the range of the argument. Toulmin's model has been employed in a number of contexts, including the analysis of ill-structured problems (Voss, Tyler and Yengo, 1983) and the analysis of political argument (Homer-Dixon and Karapin, 1989). While the Toulmin model has been criticized because of its inability to handle value-based arguments (Perelman, 1984), Hample (1977) has presented an elaboration of the Toulmin model that takes value into account, and it is Hample's version of the Toulmin argument structure that provides a basis for our model of informal argument processing.

Figure 2 presents the Hample model. The model assumes the existence of two arguments, one consisting of the claim O-X, its supporting reason O-Y, and the warrant Y-X. The warrant, Y-X, also is the claim of the second argument, which has the supporting reason Y-Z and the warrant Z-X. Values are then taken into account via the Y-Z support of the Y-X claim, as noted in the example.

Processing an informal argument

Using the Hample model as a point of departure, the processing of an informal argument is now considered. For convenience, we assume that in encountering an argument, the claim is experienced first, followed by a supportive reason.

1. The (O-X)-A activation

When a claim is encountered, we assume that an individual assesses its truth value, and that this process involves both affective and cognitive components. If presented with a proposition such as "Zurich is the capital of Switzerland," cognitive components would be expected to dominate, but if presented with a statement such as those we have employed, as for example "Abortion should be illegal," activation of attitudinal factors would likely be substantial for many people, with cognitive also, at least to some extent, activated. We therefore assume that presentation of a claim, O-X, activates one's attitude, A, regarding the topic of the claim, (O-X)-A, and that such activation is a function of topic-attitude strength. This position is consistent with that of Fazio (1986), who has maintained that attitude activation involves making an evaluation along an affective dimension, with attitude accessibility being a function of the associative strength of the attitude object or topic and the related attitude (Fazio, 1986). From these considerations it was hypothesized (Experiment 1) that a person
would respond more quickly when in strong agreement or strong disagreement regarding a given proposition than when an individual is less extreme in agreement or disagreement. Moreover, at least two factors could account for this result, namely, a strength factor and/or a decision factor. In the former, more rapid extreme judgments would be accounted for by presuming a relatively substantial associative strength between topic and attitude, while judgements of “somewhat agree” or “somewhat disagree” would have ambiguous strength components, and it would take more time to activate the topic-attitude components. A decision interpretation would suggest that the strengths in the “extreme” and “somewhat” judgments may take about the same time to activate, but that the decision would take longer in the “somewhat” case because weighing the conflicting factors would take longer.

2. The \( (O-X) - A - R \) activation

As previously stated, it is assumed that encountering a claim activates, from a person’s representation of the topic in question, reasons, \( R \), related to the claim. Furthermore, it is assumed that in processing a claim, one’s attitude tends to be activated before the activation of one or more reasons. Hence, reason activation is denoted by \( (O-X) - A - R \). It is furthermore hypothesized that reason activation is related to three factors, namely, reasons consistent with one’s attitude are more likely to be activated than reasons opposed to one’s attitude, pro reasons are more likely to be activated than con reasons, and reasons taken by the individual to be strong are more likely to be activated than the weak reasons. These hypotheses are based upon the idea that reasons should be primed via their strength of relation to the stated claim, with pro reasons more likely to be activated than con reasons because of the previously mentioned processing preference for pro reasons. Experiment 2 was designed to test these hypotheses.
3. The argument-value activation
A third type of activation presumed to occur in argument processing involves values. The Hample (1977) model suggests that the argument O-X, O-Y will activate Y-Z, where Z is assumed to be a value or set of values related to O-Y. For example, "Abortion should be illegal" may be a claim (O-X) supported by "Abortion involves the taking of a life" (O-Y). The "taking a life" is assumed to activate the set of values, related to preservation of life and to the moral issues involved.

Experiment 3 was designed to study value activation. It was hypothesized that the judged strength of the relation of a particular argument O-X, O-Y to a related value is inversely related to the speed of activation of the value, given the presentation of the argument. Second, there is the question of whether a reason judged as providing strong support for a claim would activate a value more rapidly than a reason providing weak support. We have found for example that for the claim "A 55-mph speed limit should be made law in all states," the supporting reason "A 55-mph speed limit saves lives" produces an argument rated as stronger than when the support is provided by "A 55-mph speed limit saves on gasoline consumption." Since the reasons have essentially equivalent truth value, the higher rating for "saving lives" may be attributed to the greater value ascribed to saving lives than to saving gasoline. This finding suggests that an argument having reasons regarded as providing strong support may activate the respective values associated with that reason more rapidly than an argument having a reason providing weak support.

EXPERIMENT 1

Method

Subjects
Thirty-two University of Pittsburgh undergraduates served in this experiment.

Materials
Two hundred and forty sentences were constructed with topics generally controversial in nature, such as gun control, abortion, drug testing, and AIDS testing.

Procedure and Design
In the first session, subjects were given a booklet consisting of 480 sentences, each of the 240 sentences being presented twice. Subjects rated each sentence on a 1–4 scale, 1 = agree strongly, 2 = agree somewhat, 3 = disagree somewhat, 4 = disagree strongly. Each subject returned in two weeks and was presented with sentences that he or she had previously rated identically on both presentations. To continue, a subject had to have rated at least 14 sentences consistently for each point on the four-point rating scale. One-half of the sentences at each rating
point were used for agree-disagree judgments, while the other half were used for the meaningful-nonmeaningful judgments (described below).

Subjects served in both an agree-disagree and a sentence judgment condition, with the order counterbalanced. In the former subjects pressed one of two keys indicating agreement or disagreement with a given sentence; in the latter, subjects judged whether a sentence was or was not meaningful. Nonmeaningful sentences were constructed by using sentences of the original 240 that had not received consistent ratings by the particular subject and replacing one of the words with a word that yielded the sentence nonmeaningful. Typically, the words replaced were at the end of the sentence. The semantic judgment task was included a) to compare the reaction times of this task to the agree-disagree task and b) to determine whether, if the agree-disagree judgments yielded an inverted U-shaped function as expected, the semantic judgments would also yield the same function with respect to the ratings.

RESULTS AND DISCUSSION

A regression analysis was performed for each subject in which the number of syllables per sentence was removed (cf. Graesser and Riha, 1984). Analysis of the raw reading times and the residual reading times yielded parallel results, so only the former are reported.

Table 1. Mean judgment times as a function of agree-disagree rating, and task (standard deviations in parentheses).

<table>
<thead>
<tr>
<th>Rating</th>
<th>Two-choice task</th>
<th>One-choice task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A-D</td>
<td>M</td>
</tr>
<tr>
<td>Strong agree</td>
<td>4330 (856)</td>
<td>4358 (993)</td>
</tr>
<tr>
<td>Somewhat agree</td>
<td>5185 (1285)</td>
<td>4675 (1255)</td>
</tr>
<tr>
<td>Somewhat disagree</td>
<td>5219 (1286)</td>
<td>4513 (1032)</td>
</tr>
<tr>
<td>Strong disagree</td>
<td>4378 (1032)</td>
<td>4455 (1130)</td>
</tr>
</tbody>
</table>

A-D = Agree-disagree judgment  
M = Meaningful judgment

The first data column of Table 1 presents the mean reaction time as a function of agree-disagree rating, $F(3, 90) = 19.45$, $p < 0.001$, with a trend test yielding a significant quadratic component, $p < 0.001$. These findings are consistent with other results (Eiser and Monk, 1978; Judd and Kulik, 1980), and support the hypothesis that strong agreement and strong disagreement would yield quicker reaction times than using "somewhat" judgments. Using Tukey’s HSD tests, the strong agree and strong disagree judgment response times did not differ but both differed significantly (0.01 level) from the "somewhat" agree or disagree judgment response times, which did not differ significantly from each other. The second data column, presenting the response times for meaningful judgments,
did not vary as a function of Rating, $F(3, 90) = 1.48, p > 0.10$.

A significant Task x Rating interaction was obtained, $F(3, 90) = 6.86, p < 0.001$, with response times for the agree-disagree task and the meaningful judgments not differing significantly for the strong agree and strong disagree ratings, but differing significantly for the "somewhat" ratings. Thus, at extremes, the agree-disagree judgments were essentially made as rapidly as judgments of meaningfulness.

As previously suggested, the slower "somewhat" agree-disagree judgments may be interpreted in relation to the ambiguous strength activation and/or to the difficulty of decision. In an effort to separate these factors, an additional agree-disagree condition and an additional semantic judgment task were run. The design and procedure of Experiment 1 was repeated, but in the second session, instead of subjects performing in a two-choice agree-disagree task, subjects could make only one response. In one task two blocks of sentences were represented, one containing sentences with which the given subject had agreed and the other having sentences with which the subject had disagreed. Subjects were informed at the beginning of each block whether they had agreed or had disagreed with the sentences to be presented. The task thus did not involve a choice. Subjects responded by pressing a single key when they knew they agreed with a particular sentence (for one block of sentences) or disagreed (for the other block). Another group of subjects performed a semantic judgment task in which they pressed a key when they understood a presented sentence. There were 30 subjects in the former and 28 in the latter condition.

The mean response times per rating for the agree task and for the disagree task are presented in the third column of Table 1. A significant difference among the ratings was obtained, $F(3, 87) = 8.44, p < 0.0001$, with a significant quadratic component, $p < 0.001$, also found. The "strongly agree" and "strongly disagree" ratings were not significantly different from each other, with both differing significantly for the "somewhat" judgment times, with the exception that the "somewhat agree" and "strong disagree" ratings did not differ significantly. These results indicated that even when subjects knew that they agreed or disagreed with the sentence to be presented, thereby not requiring an agree-disagree decision, the processing time needed to make the judgment was greater when the subjects were "somewhat" in agreement or "somewhat" in disagreement with the proposition than when strongly agreeing or disagreeing. This result suggests that "somewhat" judgments take longer than "extreme" judgments not because of the need to make a decision regarding agreement or disagreement but because the strength of the topic-attitude association is less when the relation is ambiguous than when unambiguous.

The mean judgment times for the time to understand ratings are also presented in Table 1. A regression analysis performed on the residuals of each subject's response times with number of syllables removed did not yield a significant effect, $F(3, 81) = 1.14, p = 0.34$. In addition, the judgments for the agree-disagree ratings and the time to understand ratings did not differ significantly from each other for the extreme judgments, but did differ significantly for the
"somewhat disagree" judgments, $p < 0.01$, with the difference for the "somewhat agree" rating approaching significance.

The results of Experiment 1 and the follow-up study support the hypothesis that attitudes are rapidly activated when an individual is presented with a proposition about an attitude-related topic. Indeed, with extreme agreement or disagreement, activation of the attitude is as rapid as understanding the proposition, a result at least suggesting that affect is represented in close relation to the semantic component. However, when somewhat in agreement or somewhat in disagreement with the proposition, attitude activation is slower (cf. Fazio, 1986). Indeed, it was slower even when individuals knew that they either were in agreement or in disagreement with the given proposition, a result suggesting that the longer time taken for making "somewhat" judgments in the agree-disagrees task may be attributable to the need to activate more components to identify one's relative agreement or disagreement and not to a decision per se. Finally, the finding that the semantic judgment task yielded no significant differences across agree-disagree ratings indicates that processing time tends to be task specific, that is, somewhat agreeing or disagreeing with a given proposition did not produce longer judgment times in the semantic judgment task as it did in the agree-disagree task.

EXPERIMENT 2

Earlier in this paper hypotheses were stated that processing a claim would activate reasons that were pro, strong, and consistent with one's attitude. Experiment 2 was designed to test these hypotheses. The experiment employed a priming design in which a claim was presented and immediately followed by a reason. Subjects, in a two-choice task, judged whether the reason was supportive or opposed to the immediately preceding proposition. Reaction time to this judgment was measured. Figure 3 presents a diagram describing the rationale of the study.

In Figure 3 four conditions are delineated that involve the pro vs. con variable and the relation of a claim to one's attitude and the relation of one's attitude to the reason. As previously noted, pro reasons were hypothesized to be processed more rapidly than con reasons, as denoted in the diagram by + marks. The claim-attitude relation is shown as either depicting agreement or disagreement. Then, given the pro-con and agree-disagree information, whether a reason is consistent or inconsistent with one's attitude can be established, as indicated in the respective conditions. According to the diagram, reasons in Condition 1 should be processed most rapidly because 1) they are pro and 2) they are consistent with one's attitude. In Condition 2 processing should be slower than in Condition 1 because although the reasons are pro, they are not consistent with one's attitude. Condition 3 should produce approximately the same processing time as Condition 2 because while the reasons are consistent with one's attitude, the reasons are con. Condition 4 should have the slowest processing time
because the reason is con and they also are in disagreement with one's attitude. The above set of hypotheses were expected to hold for the strong reasons but only weakly hold or hold not at all for the weak reasons. The important point about these hypotheses is that they are based upon the joint operation of pro and con reasons and whether the reason is consistent or inconsistent with one's attitude, and most importantly, the hypotheses about reaction time will hold only if the claim activates the individual's attitude.
Method

Subjects
Forty undergraduate paid volunteers of the University of Pittsburgh participated.

Materials
Forty claims were selected from the previously mentioned argument pool. Each proposition had a previously scaled strong supportive, weak supportive, strong opposing, and weak opposing reason.

Design and procedure
The forty propositions were presented to all subjects. Subjects were randomly divided into four groups of ten, each group being presented with each of the four types of reasons. Assignment of the four reason set sequences took place via a 4 × 4 latin square.

Each proposition was presented via computer for four seconds, followed by a one second presentation of asterisks, followed by the reason. Subjects pressed one key if they thought the reason supported the proposition and an adjacent key if they thought the reason opposed the proposition. The reaction time from the onset of the reason to the subject’s key press was measured. The reason went off the screen when the subject responded, and the next proposition was then presented. Subjects received five practice trials. The propositions and reasons were presented in a random order with blocks of eight propositions. The final phase of the experiment consisted of subjects being presented with each of the 40 claims and rating each on a 4-point agree-disagree scale.

RESULTS AND DISCUSSION

An analysis of the raw data (accuracy level above 90%) was conducted as well as an analysis on residuals that took into account differences in the sentence length of the presented reasons. The results of the two analyses were almost identical, a few discrepancies occurring in Newman-Keuls’ tests. The analyses of only the raw data are therefore presented, with discrepancies noted.

As hypothesized, reaction time to pro reasons, Mean = 5852 msec. (1430) was significantly faster than reaction time to con reasons, Mean = 6084 (1603), F (1, 95) = 7.08, p < 0.001. Whether a proposition was or was not in agreement with one’s attitude did not produce a significant difference in reason activation, F (1, 95) < 1. The interaction of agree-disagree judgment and pro vs. con reason was significant, however, F (1, 95) = 17.29, p < 0.001. The means of this interaction are presented in Figure 4. The data support the previously described hypotheses described in relation to Figure 3.

Newman-Keuls tests on the residuals data indicated that the four means fell into three groups, the agree pro, the disagree pro and agree con, and the disagree con, supporting the hypotheses described via Figure 3. (The raw data analysis
Fig. 4. Mean reaction time as a function of claim-attitude consistency with type of reason (pro or con) as parameter.

yielded a lack of significant difference of the consistent pro and inconsistent con means.)

Analysis also indicated that strong reasons were not responded to significantly more quickly than weak reasons, although the results were in that direction, $F(1, 95) = 2.68, p < 0.11$. However, the interaction of strong-weak by agree-disagree judgment was significant, $F(1, 95) = 4.92, p < 0.03$. The most rapid reaction time was obtained for strong reasons when the claim and attitude were in agreement, Mean = 5797 msec. (1670), with the disagreement-weak, disagreement-strong and agreement-weak conditions having mean reaction times of 5962 (1491), 6009 (1704), and 6104 (1613) msec., respectively. Newman-Keuls tests on the residuals data indicated that the mean agreement-strong time was significantly faster than the agreement-weak and disagreement-strong means, $p < 0.01$, but not significantly different from the disagreement-weak mean. (The raw data analysis indicated the consistent strong condition was
significantly faster than each of the other three conditions.) The data thus suggest a tendency for strong reasons to be more accessible when one’s attitude is in agreement with the claim.

The results of Experiment 2 support the hypothesis that reason accessibility is a function of whether the reason is in agreement with one’s attitude. The results also indicate that pro reasons are activated more readily than con reasons and that strong reasons, when the claim and attitude are consistent, tend to be activated more readily than weak reasons, and weak reasons more readily than strong reasons when the claim and attitude are in disagreement. The findings suggest that if asked to generate pro and con reasons for a given claim, subjects should generate more reasons consistent with their attitude than reasons that are inconsistent, more pro than con reasons, and more reasons rated by the individual as relatively strong. These results in fact have been obtained (Feather, 1970; Voss et al., 1990). In addition, the results of Experiment 2 support the hypothesis that one’s attitude is activated by the claim, since assuming such activation was a necessary aspect of explaining the pro-con x claim-attitude agreement interaction (Figures 3 and 4).

EXPERIMENT 3

As previously noted, in relation to Figure 2, Y-Z represents values presumed to be activated by the argument O-X, O-Y. The purpose of Experiment 3 was to determine whether values germane to the argument in question are activated upon the processing of an argument, and to ascertain whether speed of value activation is related to the perceived strength of the relation between the claim and value, the supportive reason and value, and the perceived strength of relation between the claim and reason. In addition, whether value activation was related to one’s relative agreement or disagreement with the claim was also addressed.

Method

Subjects

Twenty-four students of the University of Pittsburgh served as subjects.

Materials

Eight claims were employed that consisted of four claim pairs. For example, one claim may be “Abortion should be legal” while the other claim of the claim pair was “Abortion should be illegal.” For each of the eight claims, a strong and a weak reason was employed. For each claim-reason pair, one relevant and one irrelevant value was employed.
Design and Procedure
Following instructions and practice trials, subjects were presented with a claim-reason pair. After eight seconds, the computer screens cleared and a value statement was presented. The subject was instructed to respond as quickly and as accurately as possible regarding whether or not the presented statement supported the previously presented assertions. The time to make this response was measured. For example, a subject may be presented with the claim “Abortion should be illegal,” and the supporting reason “Terminating a pregnancy is murder.” Then a value statement such as “Killing is wrong” was presented. Subjects indicated whether the value statement supported or did not support the claim, and this reaction time was obtained.

Each claim-reason pair was presented twice, once with a supporting value and once with an irrelevant value, the irrelevant value being relevant to a different claim-reason pair. Thus, each value was presented twice, once as a relevant value and once as an irrelevant value. In total, each subject made 32 judgments (eight claims × two strong vs. weak reasons × two relevant vs. irrelevant value).

After making the judgments, subjects performed four rating tasks. They were asked to rate on a ten-point scale the strength of each reason’s support for its respective claim. The claim-reason pairs were presented in a randomized order. Similarly, they were asked to rate on a ten-point scale the strength of relation between each claim and the value employed in relation to the claim. They also rated the strength of relation between the reason and the value associated with the reason. Subjects concluded their rating task by indicating on a 10-point scale their degree of agreement or disagreement with each of the eight claims.

RESULTS AND DISCUSSION

Analysis indicated that there was about 90% accuracy for the relevant and irrelevant conditions. Table 2 presents a correlation matrix of the six measures employed in this study for the relevant condition data. Two points are noted regarding these data. Considering the four columns of rating data, it is clear that there are substantial intercorrelations of the perceived relations of the claim-attitude (agree-disagree), claim-reason, claim-value, and reason-value strengths. This result suggests a unitizing of these factors in one’s mental representation of an argument. Secondly, considering both the raw and residual reaction time data, significant correlations with reaction time were obtained only for claim-value and reason-value relationship strengths, that is, the greater the perceived claim-value or reason-value relationship, the more rapidly the value was accessed. This finding is notable because, coupled with the failure to obtain significance for the other two ratings, the results suggest that with presentation of a claim and reason, either factor significantly primes the value, but the claim-reason strength per se and the claim-attitude agreement or disagreement are not significantly related to speed of accessibility of the value.

A question raised by the results of Experiment 3 is whether a significant
Table 2.

<table>
<thead>
<tr>
<th></th>
<th>Raw RT</th>
<th>Residual RT</th>
<th>Claim-reason strength</th>
<th>Claim-value strength</th>
<th>Reason-value strength</th>
<th>Agree-strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw RT</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Residual RT</td>
<td>0.97</td>
<td>1.00</td>
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<td>Claim-reason strength</td>
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<td>-0.06</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Claim-value strength</td>
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<td>-0.13</td>
<td>0.32</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reason-value strength</td>
<td>-0.22</td>
<td>-0.19</td>
<td>0.34</td>
<td>0.31</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Claim-attitude</td>
<td>-0.06</td>
<td>-0.08</td>
<td>0.35</td>
<td>0.26</td>
<td>0.21</td>
<td>1.00</td>
</tr>
<tr>
<td>(Agree-disagree)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$p < 0.05 = r \geq 0.11; p < 0.01 = r \geq 0.15; (df = 382)$.

A follow-up study was conducted that involved the same materials and general procedure of Experiment 3, with the modification that in one condition subjects were presented with a claim and subsequently had to judge whether a value was related to that proposition while in a second condition subjects were presented with a reason and had to make a judgment about the subsequently presented value. (Since the claim and reason for a given argument were not presented together, the subject was essentially being asked to judge whether the value was related to the proposition that had been presented). Order of presentation for the claim-value pair and the reason-value pair for a given proposition was counterbalanced. After the reaction time phase, subjects made judgments of the strength of relation between the claim and reason, claim and value, and reason and values, as well as making agree/disagree judgments regarding the claim.

The results, using reaction times adjusted for sentence length, indicated that the judged strength of the reason-value pairings was significantly correlated, $r = 0.09, p < 0.05$, with the reason value activation reaction time such that the stronger the judged relation the faster the reaction time. The judged claim-value relation was not significantly related to the reason-value activation time. For the claim-value pairings, there was not a significant relation between either the claim-value reaction time and the claim-value ratings or between the claim-value reaction time and the reason-value ratings. These results thus indicate that only the reason, and not the claim, produces a significant activation of the value.
Thus, when individuals are presented with an argument and a value is activated, it is likely to be a strong associative relationship between the reason and value that produces the value activation.

GENERAL DISCUSSION

The results of the present experiments provide support for the previously described model of argument processing. Using Hample's argument structure of Figure 2, the major aspects of the model are that: 1) When a claim is encountered, an individual evaluates its truth value. This process involves the elicitation of the individual's attitude (and perhaps other comments of one's mental representation) regarding the contents of the claim. Moreover, the evaluation occurs more rapidly if the person strongly agrees or disagrees with claim's contents than when there is less certainty regarding agreement. 2) The claim and attitude form a complex that activates reasons related to the claim. The reasons activated tend to be those that provide relatively strong support for the claim and are consistent with a person's attitude, as well as reasons that are supportive rather than opposing to the claim. 3) When a claim and reason are presented together, a person's knowledge, beliefs and/or values may be activated, the present data indicating that value activation is a function of a person's perceived strength of the reason-value relations. The model thus emphasizes that components of mental representation such as knowledge, beliefs, attitudes, and values play a significant role in the processing of informal arguments, as opposed to an emphasis upon the tools of formal logic.

The nature of processing, as outlined above, suggests that in the case of informal arguments, what constitutes a "good reason" (cf Booth, 1974, 1979; Fisher, 1988; Wallace, 1963) is a function of one's mental representation of the topic, including one's values, attitude, and knowledge. This has the bad news that the evaluation of controversial informal arguments will be idiosyncratic, but it has the good news of recognizing, as Billig (1987) has emphasized, that there are virtually always opposing viewpoints, and that what a person believes is modifiable. Thus, an argument's evaluation may change because beliefs change.

The present findings also indicate that mental components of informal argument structures apparently involve a relatively large number of specific relationships such as claim-attitude, claim-reason, attitude-reason, claim-value, and reason-value, and that processing is a function of the strength of these relationships. This notion suggests that a spreading activation model may be useful to the understanding of argumentation and that a question of interest is how the associative strength of each set of relationships may vary as a function of context, such as claim-reason strength being perceived as stronger for use with one audience than with another.

In sum, we regard the informal argument as an extremely important discourse structure that serves as the structural vehicle by which much reasoning takes place. Moreover, understanding such reason via argumentation requires that
issues of processing be addressed, and that such study of necessity will involve consideration of an individual’s mental representation of the topic in question and its relation to the particular argument. It is, we would argue, such analysis that will improve our understanding of the argumentation process.

NOTES

1 This research was supported by the Mellon Foundation and by the Office of Educational Research and Improvement of the Department of Education via an award for the Center for the Study of Learning to the Learning Research and Development Center. The contents of the paper are not necessarily the position of any of these organizations.

2 Now at Gettysburg College.

REFERENCES

ON THE PROCESSING OF ARGUMENTS


