Reasoning in the Construction of Argumentative Texts

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ABSTRACT

This chapter is concerned with the relation between reasoning and argumentation. The position taken is that reasoning generally takes place in one of two task contexts, a formal logic-based context and/or an informal context. After contrasting reasoning in these two contexts, argumentation is considered, followed by an examination of the relation between argumentation and reasoning, emphasizing reasoning in informal tasks and argumentation. The results of a protocol study are presented, addressing the question of how reasoning occurs in the construction of an argumentative text. The chapter concludes with a discussion of how argumentative texts may be evaluated.

1 PRELIMINARY COMMENTS

The purpose of this chapter is to examine the relationship between reasoning and argumentation, and more specifically, to examine reasoning and its relation to the production and evaluation of argumentative text. The relationship between the concepts of reasoning and argumentation is neither resolved nor frequently discussed (Govier, 1989; Walton, 1992), but it is hoped that the present considerations will help to bring the issues involved into focus. In the first section of this chapter, the concept of reasoning is considered, and there is a discussion of reasoning as found in formal logic-based tasks and informal tasks. The second section presents a discussion of argumentation while the third presents data related to reasoning concerning the processing of argumentative texts. The final section considers the evaluation of argumentative texts.

2 COMMENTS ON REASONING

*Definitional Issues*

In this chapter we approach reasoning from a psychological perspective. Within this context, Halpern (1996) has provided an acceptable definition of reasoning, namely:
Colloquially, reasoning tells us 'what leads to what'. When we reason, we use our knowledge about one or more related statements that we can reasonably believe are true to determine if another statement, the conclusion, is true. (p. 119).

This definition points to particular characteristics. First, reasoning is a process. Second, in reasoning, an individual moves from a given state to a new or another state via an inference. Thus, if you have the given information, 'He placed the cigarette in his mouth and he lit it with a match', you may infer that 'he began to smoke'. Or, you may know 'He placed the cigarette in his mouth and he began to smoke', from which you may infer that he lit the cigarette. Third, to explain the reasoning process, it is necessary to determine what enables the individual to go from the given state to the new state. Fourth, an aspect of reasoning not mentioned in the provided definition is that reasoning is usually goal-related, as when solving a problem or making a decision.

Reasoning, of course, can be more extensive and complex than considered in the above definition given that the reasoning process may involve going through a series of steps; as in the solving of a problem in mathematics, physics, social science, or when solving a puzzle problem. Reasoning also increases in complexity when a group of people become involved. In such cases, individuals make inferences, perhaps based upon what other people say, and they may criticize and modify statements made by others. In such relatively complex situations, reasoning may be analyzed in steps. For example, when reasoning through a problem, a series of operators may be defined, including an operator consisting of the means by which the reasoner moves from one state of the problem to the next. The use of operators in this manner is an important part of the information processing model of problem solving (Newell & Simon, 1972; Voss, Greene, Post & Penner, 1983). We return to this point later.

**Reasoning in logic-based tasks**

Reasoning has been studied typically in one of two types of task situations. One of these, the formal task situation, has involved the use of formalized structures such as those found in mathematics and in formal logic. The second type of task situation, termed informal because of the lack of a better word, involves structures that are not part of logical systems. Deciding whether a syllogism is valid is an example of the former, whereas saying political candidates should not be elected because you disagree with their position on a number of issues, is an example of the informal context. Going back to the Greek period, the distinction is approximately that made by Aristotle in his dialectic and rhetoric (see van Eemeren, Grootendorst & Henkemans, 1996).

A large number of studies of reasoning involve deductive reasoning. Tasks used in such studies, for example, may involve asking an individual to generate a syllogism's conclusion after being given the premises (Johnson-Laird, 1983), to evaluate a syllogism for validity (Wilkins, 1928; Woodworth & Sells, 1935), or to perform a Wason and Johnson-Laird four-card task (Cf. Garnham & Oakhill, 1994). Generally, the goal of such tasks is to study whether performance is in agreement with the logical model. The question is usually, 'Did the person perform the task correctly, and if not, why?' Models of correct or error performance may also be developed (e.g., Johnson-Laird, 1983). Indeed, some authors have advocated that individuals have an intrinsic rule-based mental logic that enables them to think
logically when confronted with reasoning tasks such as modus ponens (Braine & Rumain, 1983; Henle, 1962; Rips, 1994).

Until the last few decades, psychological research on reasoning focused almost exclusively on formal logic-based tasks, especially the logic of deductive reasoning. There are a number of reasons why researchers have been preoccupied with such tasks. The tasks are more tractable than informal tasks; that is, the solution usually consists of a single correct answer, the materials and/or the solution process are logically constructed, and computer simulation of such tasks is more feasible than that found in informal reasoning tasks. But two other factors may also be of importance. One is that psychology, in its often positivistic outlook and in its concern about its status as a science, has frequently involved the study of issues that are quantifiable and deterministic rather than probabilistic and ‘soft’. Certainly, deductive reasoning has deterministic characteristics to a greater extent than the less-structured everyday reasoning. Also, in the twentieth century, there has been a carryover from the post-evolutionary thinking of the nineteenth century which made humans feel a need to demonstrate their mental superiority to nonhumans via the ability to reason or, in other words, to show rationality. Indeed, Halpern (1996), in a widely cited text, states, ‘Reasoning is often taken to be the hallmark of the human species’. (p. 119). Interestingly, a researcher working in argumentation theory, Fisher (1987), has argued that it is the ability to create narratives that characterizes humans.

The following are characteristics that distinguish logic-based tasks from informal tasks. First, deductive reasoning tasks can be typically represented by symbols, such as converting a sentence to ‘All A are B’. Converting the propositions into logical form, thus makes the statements content-free. The specific contents of the sentences are not taken into account; the only important issue is the logical form. Second, there is typically one correct answer. A conclusion does or does not follow from the premises. Because of this, there are typically no counterarguments. Third, evaluation occurs via an application of the rules of the logic, as the categorical syllogism or propositional logic.

Three other points concerning tasks of formal logic are noted. One example of a type of rationality ascribed to humans involves a person performing a Bayesian task, or generating the conclusion to a syllogism, which is judged ‘rational’ if the person’s performance conforms to the particular model under study – for example, providing the answer predicted by Bayesian theory. Thus the model is a standard, and ‘rational’ performance constitutes being in agreement with the standard, as mentioned above. This is an interesting view of rationality because humans developed the mathematical or logical system and if some other human conforms to the human-based system, then ‘rationality’ is demonstrated; that is, when the person is performing in a way like other humans, in this case human system-makers, say he should.

A second point is that the structure of logic-based tasks is an argument. The type of argument may vary, as in a categorical syllogism or in a propositional structure of ‘modus ponens’ or ‘modus tollens’. Nonetheless, the structure is that of an argument. However, there is little argumentation in the sense of social disagreement and interchange. As noted above, there are not usually two sides, and persuasion is a relatively minor matter or virtually non-existent.

The third point about logic-based arguments is when they are used. What is the goal in using logic-based tasks? Apart from the use of such tasks in research and mathematics, logic-based arguments seem to be used infrequently in every-
day life, occurring in cases such as, 'There are three ways in which this could have happened. It could not be the first or second, so it must be the third'. From this example, it is apparent that the goal of reasoning in using formal logic structures is generally to arrive at a conclusion that is the one and only correct answer. The structure is usually deterministic, and, as is the case with analytic arguments, the conclusion provides no information that is not in the premises. Correspondingly, if a person evaluates a logic-based argument, the evaluation involves going through the steps to determine whether the correct conclusion was reached.

Reasoning in informal reasoning tasks

Informal reasoning tasks typically involve the use of a different argument structure than that found in logic-based tasks. The structure is the enthymeme, as found in Aristotle's Rhetoric (1960), and consists of a claim supported by a reason. Combining arguments may readily develop a more extensive argument structure.

Informal reasoning - that is, reasoning in informal task situations - takes place in many contexts. These include decision making, in which a person may generate pro and contra reasons for a claim (Perkins, Allen & Hafer, 1983), and tasks calling for justification (Kuhn, 1991; Means & Voss, 1996; Voss, Perkins & Segal, 1991). For example, Kuhn (1991), studying evidential statements, asked people of various ages and educational backgrounds questions such as why so many prisoners, after being released, committed crimes and re-entered prison. Similarly, Stein and Miller (1991) studied children's perceptions of breaking promises, and the justifications thereof.

In informal reasoning tasks, contents are important because evaluation is based upon the contents. There is no 'right' answer, only an argument that may be stated and considered to range in strength from relatively strong to relatively weak. Counterarguments may be offered; that is, an argument in which the claim is a contradiction of the claim of the original argument.

With respect to the evaluation of arguments in informal reasoning, two factors are important. First, in an argument consisting of a claim and a supporting reason, the supporting reason needs to be plausible or acceptable. Moreover, the plausibility or acceptability of the reason may be judged or rated on a scale from 0 = not acceptable to 10 = highly acceptable, with the numbers 1 to 9 ranging between the extremes. Thus, in the argument 'Capital punishment should be outlawed because it is inhumane', the supporting reason 'it is inhumane' may be rated by some people with a '9' or '10', while other individuals may think capital punishment is not inhumane and may provide a relatively low rating.

The second factor is that the reason needs to support the claim, a factor sometimes called relevance (Cf. Angell, 1964). Again, the perceived extent of support may vary from person to person. In some unpublished work, we found a relationship between the two factors, such that if the reason was relatively unacceptable, the perceived support for the claim was relatively low. This result is not surprising, as a substantial perceived strength of the supporting reason should be a necessary, but not sufficient, condition to perceive the argument as being relatively strong.

A third factor of evaluation sometimes indicated is that of taking counter-arguments into account (Angell, 1964). This factor is included when the strength of an argument cannot be appropriately judged unless arguments against the position are taken into account. This criterion, however, is infrequently found.
An important question reasoning in informal situations is the goal of such reasoning. A primary goal is persuasion, broadly conceived to include self-persuasion. Informal reasoning can also take place in the context of goals such as solving a problem, considering choices and making a decision, and other probabilistic situations.

In sum, reasoning takes place when a given situation evokes it. To avoid the circularity implicit in this statement, such situations typically arise when the individual seeks a particular goal and is required to think about what steps are needed to reach that goal. The process of taking those steps, which usually involves explicitly or implicitly stated language or other symbols, constitutes reasoning. The situational context may consist of the premises, and the goal may be to generate a conclusion, as in the case of a syllogism. Or, the context may consist of a probabilistic situation in which a person is deciding what to do. The logic-based and informal tasks are different, however, in the ways previously described, and everyday situations typically involve informal rather than formal reasoning. The above portrayal explicitly assumes that the type of reasoning that takes place is a function of the circumstances or situations, including the goal of the reasoner. Having considered the issues involving reasoning, we turn to the topic of argumentation.

3 ARGUMENTATION: SOME COMMENTS

Definitional considerations
Argumentation has been defined by Zarefsky (1995) as ‘the practice of justifying decisions under conditions of uncertainty’ (p. 43). This definition seems reasonable, although our preference would be to change ‘decisions’ to ‘claims’. Van Eemeren, Grootendorst, and Snoeck Henkemans (1996) define argumentation as ‘a verbal and social activity of reason aimed at increasing (or decreasing) the acceptability of a controversial standpoint for the listener or reader, by putting forward a constellation of propositions intended to justify (or refute) the standpoint before a rational judge’ (p. 5). This definition, compared to Zarefsky’s, explicitly makes argumentation a social phenomenon. However, we feel that ‘of reason’ and ‘before a rational judge’ could be deleted because it is not clear what ‘of reason’ could mean (is it opposed to ‘of emotion’?), and the concept of a ‘rational judge’ seems to connote an abstract fiction. The term argumentation is thus taken to refer to the attempt to persuade another party or parties of one’s own position about a controversial issue.

Because argumentation, as described in the latter definition, is a social process, it is important to consider the term ‘argument’ in relation to argumentation. Argument refers to a language structure having a particular form: this usage says nothing about social processes any more than any statement about language. A second usage is that argument constitutes a disagreement in which two or more people disagree regarding a particular proposition: this usage is directly related to argumentation as a social process (see also O’Keefe, 1977).

Characteristics of argumentation
When does argumentation occur? If there is agreement about an issue, there is no argumentation (ignoring a devil’s advocate role). When there is disagreement and positions are known to be firm and will remain that way, there is no argumentation. Argumentation occurs when individuals are attempting to defend their own
position, attack another position, and/or persuade those holding the opposing position. It is important in this context to note that frequently the goal is to persuade and not to resolve. It is to win and not compromise. On the other hand, in a conflict situation such as negotiation, the goal may be to resolve (Cf. Stein, Bernas, Calicchia & Wright, 1996).

Argumentation may also be used cooperatively. In a study of mathematics learning Vye, Goldman, Voss, Hmelo, Williams & the Cognition and Technology Group at Vanderbilt (1997) found that when working in pairs, one child, in disagreeing with the other child of the pair, was most frequently serving a monitoring function. It examined the correctness of the statements, suggesting a change if there was disagreement. Corrective steps were then sometimes taken. While this is a cooperative effort to reach the appropriate answer, persuasion is nevertheless a component.

Argumentation may also occur within an individual. Often, when an individual makes a decision, the costs and benefits of each side are considered. And, as Gross (1990) commented about scientists, ‘Rhetorically, the creation of knowledge is a task beginning with self-persuasion and ending with the persuasion of others.’ (p. 3). Similarly, costs and benefits or pro and contra reasons may be generated when an individual is considering a choice or decision (Cf. Toulmin, 1958; Zammuner, 1987).

Argumentation is generally public. When two people or more are involved, argumentation is a public process. It may also take place in classroom settings (e.g., Pontecorvo & Girardet, 1993), with students attempting to reach a final answer, as in mathematics, or attempting to provide supportive and opposing arguments to a given claim about history.

In sum, argumentation, as outlined in this chapter, denotes a particular type of social interaction involving disagreement. The language structure employed is the argument, and arguments are presented for persuasion, or sometimes for resolution. Interestingly, psychological investigation on argumentation has not been extensive. Social psychologists have employed argumentation in their concern with attitude change. Moreover, each of the two theoretical notions of attitude change (Chaiken, 1980; Petty & Cacioppo, 1986) has delineated a more central, deeper means of attitude change, and a more peripheral means - not unlike the distinction of ‘convince’ and ‘persuade’ that has been made in argumentation theory literature (e.g., Perelman & Olbrechts-Tyteca, 1958). In general, the central means is via a ‘deeper’ processing in which an individual’s beliefs are activated and related to the new information, while in the peripheral case, attitude change may result from more superficial processing as via the use of heuristics.

Persuasion may also take place because of the context in which an argument is presented. As noted in Aristotle’s Rhetoric, persuasion occurs not only via logos, the substance of the argument, but via ethos and pathos, the appeal to the speaker and to the audience, respectively. Argumentation, however, is primarily concerned with logos. Thus far we have considered reasoning and argumentation. We now turn to the relation between the two concepts.

4 THE REASONING UNDERLYING ARGUMENTATION

In this section we consider the nature of reasoning when it is used in the development of argumentative texts. The assumption is that in the development of argu-
mentative text, reasoning takes place, typically informal reasoning, in which an individual considers aspects of the issues under consideration, ultimately producing a text consistent with the choices and justifications occurring in the reasoning process. However, the text does not summarize the process itself, but provides the primary conclusions that are the product of the reasoning process.

In a study by Voss, Greene, Post and Penner (1983), the solving of ill-structured problems was studied - the problems being about the Soviet Union. Protocols were collected from experts and novices about how to increase Soviet crop productivity. The protocols were analyzed, with the problem solving process divided into problem representation and problem solution phases.

The authors made a distinction between a problem solving structure and a reasoning structure. The problem solving structure contained representation and solution phases, with the reasoning structure involving the breakdown of the representation and solution phases. The reasoning structure was thus at a lower level, and involved the step-by-step reasoning that occurred in the reasoning's subordinate relation to the problem solving structure.

It is of importance is that the problem solving and reasoning structures each contained a set of operators. Operators vary with the task, and in this case the reasoning operators were: state argument, state assertion, state fact, present specific case, state reason, state outcome, compare and/or contrast, elaborate and/or clarify, state conclusion, and state qualifier. These operators were sufficient to describe the protocol contents of the reasoning structure. The problem solving structure operators were: state constraint, state subproblem, state solution, interpret problem statement, provide support, evaluate, and summarize. These are relatively high level problem solving operators, while the reasoning structure served to unpack and develop the problem solving structure.

Given the nature of the operator concept, it seems reasonable to hypothesize that when an individual is generating an argumentative text, a process similar occurs to that which occurred during protocol generation in the solving of an ill-structured problem. The individual is attempting to generate a text that is persuasive, and reasoning takes place in order to construct such a text. Furthermore, while the goal is to construct an appropriate and quality text, it is during the construction that various factors can influence the reasoning process. These factors are the writer or speaker's perception of the audience, the beliefs and attitudes of the writer, the knowledge of the writer, perhaps the writer's personality and emotionality, and particular stylistic characteristics. In other words, these factors can influence the reasoning process that feeds into the text construction.

Given that the individual has a goal - that is, the writing of the argumentative text to produce some type of effect - and given that reasoning takes place when trying to reach this goal, it would be reasonable to hypothesize that a finite number of operators will describe the steps that take place in the writing of this text. These operators will tell us something about the reasoning process occurring in this context. More specifically, if 'think aloud' protocols are collected while the individual is generating the text, it should be possible to define the operators, and thereby try to provide an accurate analysis of the reasoning process that fed into the writing of the text. The results of such a protocol analysis are examined in the next section to provide a sense of the reasoning processes which occur when generating an argumentative text.
Some data
Since the operators employed are a function of the task, the question is what operators are used when a person constructs an argumentative text. The following operators can be expected to be present: state a claim for one side of an issue, state a claim for the other side of an issue, provide a fact or other statement in support of a given side, provide a fact or statement in opposition to a given side, refute a statement, and elaborate or clarify. Other operators could include state interpretation, state strategy, and state conclusion.

We conducted a brief study in which two undergraduates and one faculty member, an attorney, were provided with two fictional legal cases. Each involved a murder and each consisted of the presentation by testimony of a number of witnesses in a courtroom trial situation. While reading each case, each participant was asked to say anything that came to mind. In the case discussed in this chapter, an individual driving home from work struck a small girl as she ran out into the street from behind a car. The driver got out and checked the girl, finding she was not seriously hurt, but a group of teenagers attacked the driver, one of whom was the older brother of the girl. One of the teenagers hit the driver with a baseball bat and the driver was killed. A witness from across the street could not identify who had the bat. The police came and found a bat in the back seat of the car of the girl’s older brother, the bat having the victim’s blood and hair on it as well as the fingerprints of the brother. The brother said he had used the bat earlier in the day for playing baseball, and pointed out that someone wearing batting gloves (to hold the bat) could have also handled the bat but did not leave any fingerprints.

The participant read the testimony of ‘witnesses’, which provided the basic description of the events, and then was asked to think out loud and decide whether he would want to defend the accused – that is, the older brother – or be the prosecuting attorney. After deciding which side he would take, he was asked to type a summary statement of his case from his side’s perspective. He was also to think out loud when typing. After completing the summary, each participant was asked to type the summary he would present if he had chosen the other side of the case. The procedure was then repeated for the second text, which concerned three men deer hunting, with one man shooting one of the other two. The question was whether it was an accident or murder. Only the first case is discussed in this chapter.

Taking the expert first, during the reading of the ‘witness’ statements, the following comments were made. The operators employed by the expert were presented in Table 1.

Table 1 Operators used by the expert.

<table>
<thead>
<tr>
<th>Operator</th>
<th>Operator's Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>State recapitulation (Recap.)</td>
<td>Review information</td>
</tr>
<tr>
<td>State observation (Obser.)</td>
<td>Comment not directly related to case</td>
</tr>
<tr>
<td>State interpretation (Inter.)</td>
<td>Comment interpreting aspect of case</td>
</tr>
<tr>
<td>State need for search (Search)</td>
<td>Look for information or outcome</td>
</tr>
<tr>
<td>State strategy (Strat.)</td>
<td>Statement of case-related strategy</td>
</tr>
<tr>
<td>State claim for defense (Cl-def.)</td>
<td>Statement of claim for defense</td>
</tr>
<tr>
<td>State reason support defense</td>
<td>Statement of reason supporting</td>
</tr>
</tbody>
</table>
claim (Re-def.)
State fact (may be neutral, favoring defense side, or favoring prosecution side) F neu, F def, or F pros, respectively
State claim for prosecution (Cl-pro)
State reason supporting claim for prosecution (Re-pro)
State evidence for prosecution (Ev-pro)
State evidence for defense (Ev-def.)
State disagreement (Disag.)
defense claim
Statement of fact
Statement of claim supporting prosecution position
Statement of reason support defense position
Statement of evidence for the prosecution
Statement of evidence for the defense
Statement of disagreement

I want to see who we are talking about here. Richard Martin is the victim. His is the one who approached with the car. Mary Hawkins is the five year old. He gets out. The defendant is Anthony Hawkins, but we have not met him yet. But we know from witnesses he was there. (Recap. for all statements in the paragraph).
The defendant is the older brother of the girl. The bat was found in his car. (Recap.)
The defendant's testifying, huh? (Obser.)

When making the choice of whether to prosecute or defend, the following statements were made.

I am thinking about what kind of argument I could make on behalf of the defense. (Search). I would focus on a lack of connection between Anthony Hawkins and the person who struck the victim with the bat. (Strat). Richard Martin was killed by this bat but we do not have anybody who actually saw Anthony Hawkins striking the victim with the bat. (Cl-def, Re-def). It is his bat. (F pros). And presumably we also would have a motive because he would have been angered because Martin hit his sister. (Cl-pro, Re-pro). But no witness saw him strike the blow. (Cl-def (implied), Re-def). There were other people around, the bat was there, somebody else could have struck the blow and put the bat in the car. (Cl-def, Re-def). Why would somebody else strike the blow? (Search). A neighborhood crowd was there and somebody wanted to do what Anthony Hawkins wanted him to do. (Cl-def). But then why would they take the bat and put it in the car? (Search). There is the question about the lack of anyone else's fingerprints on the bat. (Search, ev-pro). And his explanation of why there are no other fingerprints on the bat involves batting gloves. (Search, ev-pro). And that strikes me as implausible. (Disag). I think this is not a good situation for the defendant. (Inter). And the best think going for him is that nobody saw him with the bat. (Cl-def (implied), Re-def). But his explanation regarding fingerprints is weak. (Cl-pro).
I would take the defense side since it is a strong case against the defense side since it is a strong case against the defense and that makes it more interesting.

The listing of the operators used by this expert as found in Table 1 provides a sentence level analysis of the reasoning operators used. Further study of this type
would no doubt require some additions, and perhaps deletions, of operators, and certainly some fine tuning. But at a more general level, expert performance embraces the following characteristics. First, the expert reviewed the evidence and made sure that he understood what the events and who the people were. Second, there is a virtual on-going examination of the evidence. The expert asked questions about the evidence and about what more might be needed. He searched for inconsistencies in the evidence, and he thought about what evidence made sense and what did not. Third, the overall schema he employed was to develop his representation of the case by considering the case from both sides, and examining the evidence for each side. This procedure is in all likelihood a practice acquired in training and refined through experience. Yet, to use this general approach effectively also requires that the person takes the appropriate steps in the lower level reasoning process.

The case summary that the expert wrote was:

No one saw Anthony Hawkins strike Richard Martin with the bat. Yes, it was Anthony Hawkins' bat, it was found in Anthony Hawkins' car, but in a crowded situation, no one saw Anthony Hawkins strike. In the emotional melee that followed the accident in which Richard Martin struck Anthony Hawkins' sister, any one of the seven men, all of whom were Anthony Hawkins' age, might have picked up the bat out of the unlocked car, struck Martin and returned the bat to its place. Odd: the bat is returned to the car.

Seven males were walking in the neighborhood after the ballgame. Hawkins' bat was put in his car. He might have been seen by others putting it into the car. The accident occurs. He recalls the bat and grabs, strikes Martin, and replaces the bat in a panic. But it could have been any of them. It is true, no fingerprints were on the bat other than Hawkins', but he was playing with the bat. But the other people coming home from the game may have been wearing batting gloves. Standard is beyond reasonable doubt.

When subsequently responding on the prosecutor's side, the expert stated:

We have a weapon; Anthony Hawkins' bat. We have a motive; Anthony Hawkins witnesses Richard Martin's striking his little sister. The bat is readily at hand in Hawkins' car. It has the blood of the victim on it. It has Hawkins' fingerprints on it. No one else's fingerprints are on the bat. Witnesses saw someone swing a bat and hit Richard Martin. They may not have seen Anthony Hawkins swing the bat, but they saw Anthony Hawkins in the group. Significantly, only Anthony Hawkins' fingerprints are on the bat. There is no plausible explanation for how someone else swinging the bat would not have left fingerprints on it. We do not have any testimony that anyone was wearing any gloves, as suggested by Anthony Hawkins.

The expert's reasoning, as shown in his protocol and subsequent statements, indicates that the operators employed were quite goal-oriented, isolating the strengths and weaknesses of each side of the case. He considered how to strengthen the weaknesses of his own case, which by-and-large meant weakening the strength of the opponent's case - as shown by the use of the 'state fact' and 'state interpretation' operators, with the interpretation usually occurring in relation to one side of the case. Interestingly, the case summary of the expert does not include the events
perceived as inconsistencies, and presents a more straightforward summary of the defense's case. The summary which the expert wrote is a sense of the summary of the points he made in his deciding about the side he wanted to pursue, and he was actually focusing on the defense from the beginning.

The protocols of the novices are not presented in detail; instead, they are summarized and compared to that of the expert. First, the novices used many of the same operators as the expert, including the statement of interpretation, of facts that supported the side of the case they had chosen or would choose to defend, and the statement of observations. This result suggests that at the lower level, novice reasoning was similar to that of the expert. Secondly, novices did not recapture information as did the expert. Thirdly, novices did not examine both sides of the evidence and seek inconsistencies. They were much more likely to state that they thought a given person was guilty or not guilty and look at evidence supporting their own side.

The results of the exploratory protocol study suggests that in the preparation for writing an argumentative text – that is, the prosecutor or defending lawyer's summary – reasoning consisted primarily of four components. One is an analytic component in which the expert participant determined the strengths and weaknesses of each side of the case. The expert was more inclined than the novices to examine both sides of the case. A second is a clarification and recapitulation component which enabled the participant to be sure he understood the text contents. The third consisted of generating possible interpretations, including alternative interpretations, to those offered or implied by one interpretation of the presented information, with experts more astute in this regard. The fourth component is the elucidation of unexplained questions, facts, oddities, and inconsistencies. It was again the expert who concentrated to a greater extent on seeking and finding oddities or inconsistencies, and seeking to resolve them.

5 THE EVALUATION OF ARGUMENTATION FOUND IN NARRATIVE TEXTS

There are two aspects to an argumentative text, its generation and its evaluation. The focus of study in the present chapter has been on the former, but the issue of argumentative text evaluation requires study. Recently, we studied the question of the evaluation of arguments when the arguments are found in narratives (Voss, Wiley & Sandak, in press). Such arguments occur in history, for example, or in a courtroom. With regard to the courtroom context we considered earlier, a prosecuting attorney in his or her summary statement could make the claim that the defendant was guilty, with the summary narrative that is presented supporting the claim. As noted by Voss, Wiley and Sandak, the narrative may be viewed as having two components. The first component is the set of 'facts' of the case – that is, the statements of the witnesses and the exhibits – while the second component is the narrative as it weaves together the 'facts' into a coherent 'story' which, for the prosecutor, points to the accused as guilty.

The two-component concept leads to the hypothesis that the 'facts' of a case may be kept constant across different narratives, while the narrative structure is varied. Under such conditions, the characteristics or quality of the narratives may be judged, as well as the contents. In the present case, for example, a judgment about contents would involve the possible guilt or innocence of the accused.
But judgments about the narrative and the contents may not be independent. Specifically, it may be hypothesized that if the narrative is deficient in some way, not only may judgments of narrative quality be lower than those made for a standard narrative, but the judgments of guilt would also be lower: that is, opposed to the prosecutor’s case which constituted the narrative.

In such a study, narratives need to be constructed that are deficient in narrativity. In a study by Leinhardt, Stainton, Virji and Odoroff (1994), historians were asked what were the characteristics of a good narrative, indicated that of importance were coherence, chronology, completeness (in the sense of using available information), causation, and colligation (placing the narrative in the appropriate time and place). Moreover, in their work on jury decision making, Pennington and Hastie (1993) stated similar characteristics.

In the study we conducted, there were four narrative conditions: a standard narrative, a narrative deficient in chronology/coherence, a narrative deficient in causality, and a narrative deficient in completeness. It was found that if a standard narrative were modified to decrease its coherence/chronology or its causative components, judgments of narrative quality were lower than for the standard narrative. In addition, judgments of the accused’s guilt in these two conditions were also less than those found in the standard condition.

The results of the above study suggest that in the evaluation of an argumentative narrative, the argument may be evaluated based upon the previously mentioned criteria. However, the quality of the narrative, as defined in relation to the characteristics of good narrativity, is also important. One may argue, of course, that an argumentative text is often expository, but in history, narrativity is relatively common, and whenever a ‘story’ is used to support a claim, issues of narrativity are important. Indeed, Aristotle pointed out that narrative is used rhetorically to persuade, being used as a form of support for a claim. Thus, while the reasoning that is involved in the generation of argumentative text may be studied via the use of reasoning operators, the evaluation of argumentative text leads us to the need to consider not only the contents of the argument stated in the text, but also the quality of the text’s structure. Our work applied to the narrative genre, but the same idea would likely hold for other text structures, such as expository ones. Further work is needed, however, to understand more clearly the relation between judgments made about narrativity and text structure in general, and judgments made about the contents of a given text.

Our conclusion about the relation between reasoning and argumentation is that one aspect consists of examining the use of particular reasoning operators to develop a better understanding of the reasoning that goes into the generation of an argumentative text. Furthermore, a study on the evaluation of argumentative text suggested that for an argumentative text to be effective, both the contents of the argument and the quality of the text structure are of importance. Consequently, this conclusion is relevant to argumentative text construction.

Our conclusion does not imply that the issues discussed are the only ways in which reasoning and argumentation are related. From a psychological viewpoint, for example, we would argue that inferences, by the nature of the case, are generally arguments (see Pinto, 1995). But that is a matter outside the scope of this study.
6 CONCLUSIONS

The study of reasoning, as viewed by a psychological perspective, requires the separation of logic-based deductive reasoning tasks from informal and everyday tasks. While the former is concerned with logical thinking and the validity of conclusions, as based upon the rules of logic, informal reasoning is related to dialectic and rhetoric, and bears a close relation to argumentation. In the present chapter we presented some data and a summary of results of another study suggesting two things. First, the nature of the reasoning that occurs when constructing an argumentative text may be studied by the use of reasoning operators involved in the reasoning taking place. Second, the quality of argumentative text must refer not only to the argumentative text contents, but also to the quality of the text – as for example, the quality of a narrative stating the argumentation. Furthermore, the reasoning operators obtained in the present study – that is, those found in Table 1 – would likely generalize to other courtroom situations and, for the most part, also to decision situations. This possibility suggests that in generating argumentative text, individuals employ operators selected from a group that are relevant to the existing context; that is, type of issue or problem in its total context. Moreover, the argumentative text development involves informal reasoning that consists of making claims and examining their viability by considering support and opposition to the claims.