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Toward a Reader-Based Model
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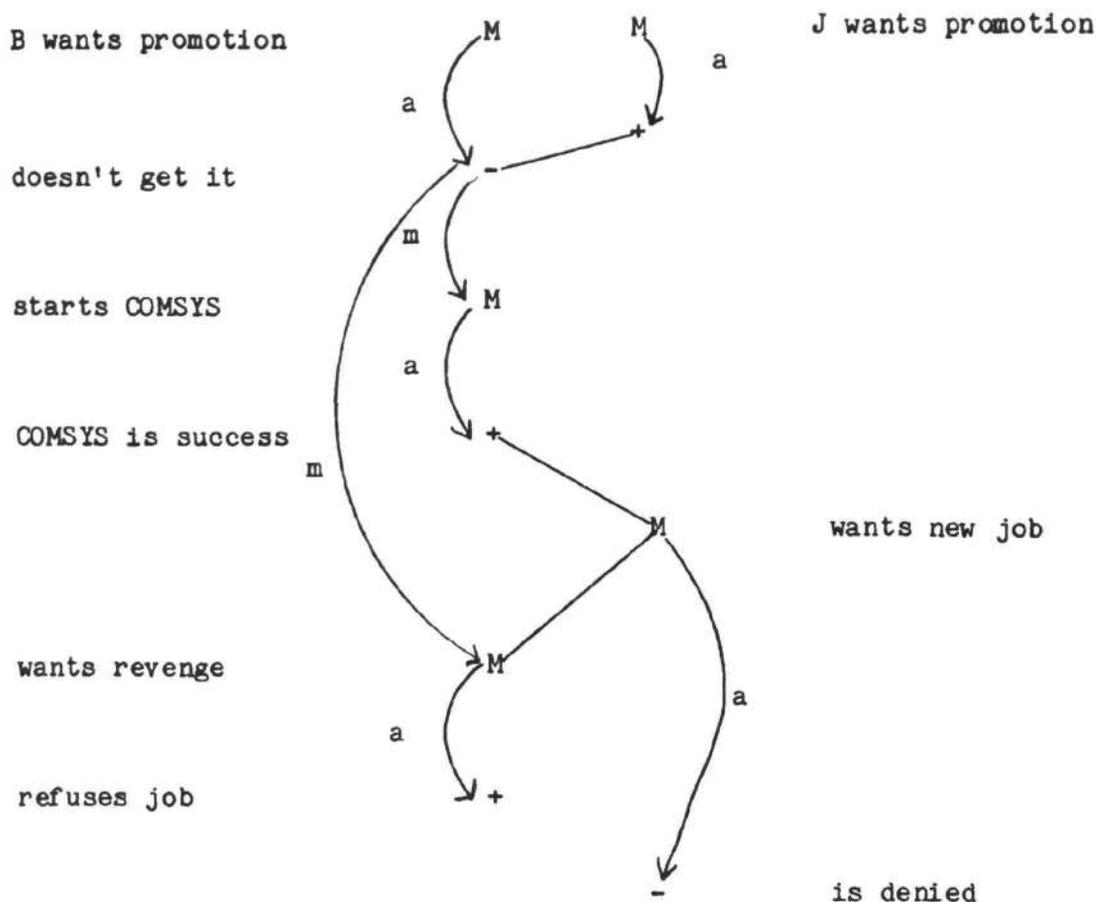University of Illinois

## 1. INTRODUCTION

During the past decade, researchers in psychology and artificial intelligence have become increasingly interested in the plans, goals, motivations, and emotions of story characters [Schank and Abelson, 1977; Wilensky, 1978; Dyer, 1982; Lehnert, 1982; Wilensky, 1983]. An inevitable outcome of this process has been an increasing concern with what makes stories interesting [Wilensky 1983], enjoyable [Brewer, 1982; Brewer and Lichtenstein, 1982], and thematically significant [Dyer, 1982; Lehnert et al., 1982]. However, despite recent progress in analyzing stories, current story processing models will have little success in recognizing high-level constructs such as themes unless they include, in addition to a model of the characters' plans, goals, motivations and emotions, a reasonably complete model of the reader's belief system. Ideally, the reader's belief system should enable the reader to understand the author's point in writing the story. For example, if a story is ironic, the reader must understand the author's implicit beliefs well enough to know when the author is being sarcastic or satiric. Similarly, if a text is didactic, the reader must understand the author's attitude toward moral and immoral actions in order to grasp the point of the story.

In this paper we propose an alternative to current story processing models which includes, in addition to a model of the characters' motivations and actions, a model of the reader's belief system. Since our model is intended to account for the comprehension of didactic stories, such as fables, the reader's belief system is based on the concept of a "just world" [Lerner, 1980]. Lerner's "just world hypothesis" describes a system of moral justice in which it is intrinsically satisfying for good actions to triumph over evil actions. In the context of the story world, the just world hypothesis predicts that stories will be morally satisfying when "good" characters experience positive outcomes and "bad" characters experience negative outcomes. However, in order to assign characters positive or negative valence relative to the story's outcome, it is first necessary to compare each character's actions to a set of normative rules that describe appropriate conduct. To illustrate the importance of this process in determining the point of a story, we will compare the predictions made by our model to story understanding systems recently developed in artificial intelligence.

## 2. PREVIOUS AND RELATED WORK

Since the point of a story depends, in part, on the actions and emotions of story characters, an adequate model of story understanding will have to include a level of analysis that is able to represent what characters actually do and feel. Researchers in artificial intelligence have made several important contributions to this endeavor. For example, Dyer's [1982] system BORIS includes, among other knowledge sources, a component for representing the emotions and interpersonal interactions between story characters. Similarly, Lehnert's [1981; 1982] work on plot units provides an excellent notational device for capturing the emotional reactions of characters to narrative events. Lehnert suggests that narratives can be represented by three affect states generated by the dimensions Desirability and Attainment. These states include emotions associated with positive events (+), negative events (-), and mental states (M). In addition, Lehnert specifies four types of connections, or affect links, that describe an oriented arc between two states. MOTIVATION links (m), for example, connect positive or negative states to mental states, while ACTUALIZATION (a) links connect mental states to positive or negative outcomes. TERMINATION (t) and EQUIVALENCE (e) links connect mental states to other mental states, or events to other events. According to Lehnert, states and links can combine to produce affect units that are capable of representing different types of plot structures. An example of how Lehnert would analyze a simple story based on retaliation is presented below. The COMSYS Story

John and Bill were competing for the same job promotion at IBM. John got the promotion and Bill decided to leave IBM to start his own consulting firm, COMSYS. Within three years COMSYS was flourishing. By that time John had become dissatisfied with IBM so he asked Bill for a job. Bill spitefully turned him down.

B wants promotion          M      M  a          J wants promotion

                                    a              +

doesn't get it           −

                         m

starts COMSYS              M

                         a

COMSYS is success          +

                              M                    wants new job

                         m

wants revenge            M

                         a                      a

refuses job              +

                              −                    is denied

Using Lehnert's summarization algorithm, we can generate  the  following
summary based on the pivotal unit RETALIATION:

"Because John was promoted over  Bill  at  IBM,  Bill  started  his  own
company, and later refused to give John a job when he asked for one."

     While the plot unit analysis provides an  appropriate  summary  for
the  "COMSYS  Story"  (summarization  was,  in  fact, Lehnert's goal), a
summary is not as general as the story's point or theme.   For  example,
if  we  were asked to generate a moral for COMSYS we might say that "one
bad turn deserves another," replacing specific actors and actions in the
story  by  an  abstract general statement.  In addition, a summary is not
really evaluative, in that it does not tell us  whether  the  actors  or
actions  in  the  story  were  good  or  bad or right or wrong.  Moral
judgments of this kind, while triggered by the  characters'  motivations
and  actions, are typically embodied in the belief system of the reader.
In the following section, we will describe an augmented model  of  story
understanding  that  uses  plot unit representations in conjunction with
the reader's belief system in order to make predictions relevant to  the
point of the story.

## 3.  A READER-BASED MODEL OF NARRATIVE UNDERSTANDING

     The model we propose contains three levels of analysis (see  Figure
1).  The  first  level  is based on Lehnert's notion of a plot unit, and
represents the intentions, behaviors, and affective states of the  story

characters. The second level of analysis represents the just world belief system of a hypothetical reader. During story processing, the reader (or story processor) compares the actions of story characters represented at the first level against just world rules describing normatively appropriate behavior. If a story character commits a moral transgression, that character's valence changes from 0 (neutral) to -. Conversely, if a story character upholds a normative rule, that character's valence changes from 0 (neutral) to +. Character valence is the final level of analysis that is necessary to generate predictions relevant to the point of the story.

Based on the preceding description, the analysis in Figure 1 can be summarized as follows. The first plot unit, COMPETITION, tells us that John has succeeded in defeating Bill. However, although John experiences positive affect as a result of success, the just world rules tell us that, if John causes negative affect for Bill, either Bill or some unknown agent will cause negative affect for John. Thus, although the character John experiences positive affect, the reader assigns negative valence to John and predicts a negative outcome for John in the future. The next plot unit, SUCCESS BORN OF ADVERSITY, does not satisfy the prediction spawned by COMPETITION, and spawns no further predictions of its own. However, the plot unit RETALIATION, in which Bill causes negative affect for John, satisfies the prediction spawned by COMPETITION. (A satisfied prediction is marked by an asterisk in the character valence column.) Once an active prediction has been satisfied, the point of the story is generated by forming a causal link between the antecedent of the just world rule that spawned the prediction (If X --> -Y) and the event satisfying the prediction (Y --> -X). This base rule corresponds to the moral of the story suggested in the previous section: "One bad turn deserves another."

## 4. CONCLUSION

The purpose of this paper has been to establish the importance of a non-character-based belief system in generating the moral or point of a story. The main difference between the model proposed here and other story understanding systems, such as Lehnert's, is that Lehnert uses plot units to generate the summaries of stories, while we view plot units as a means to generate predictions relevant to the point of the story. Although a representation of the characters' plans, goals, behaviors, and emotions is a necessary component of any story understanding model, the level of character analysis, while appropriate for the purpose of summarization, is not sufficient to generate the point of the story. Understanding story points requires both the ability to make moral judgments about the actions of story characters, and to use such judgments to make further predictions about character outcomes. A prescriptive belief system that describes normatively appropriate behavior is requisite in both of these cases.

An interesting side effect of a multi-leveled belief system is that readers and characters often experience different reactions to story events. For example, in the "COMSYS Story" we saw that, although John experienced positive affect in defeating Bill, the reader assigned negative valence to John. Similarly, although John experiences negative

affect at the conclusion of the story, the reader feels morally satisfied because the just world prediction B --> -J is fulfilled. As long as such differences in expectations exist, one needs to have a theory of story understanding that includes both reader-based character-based information.
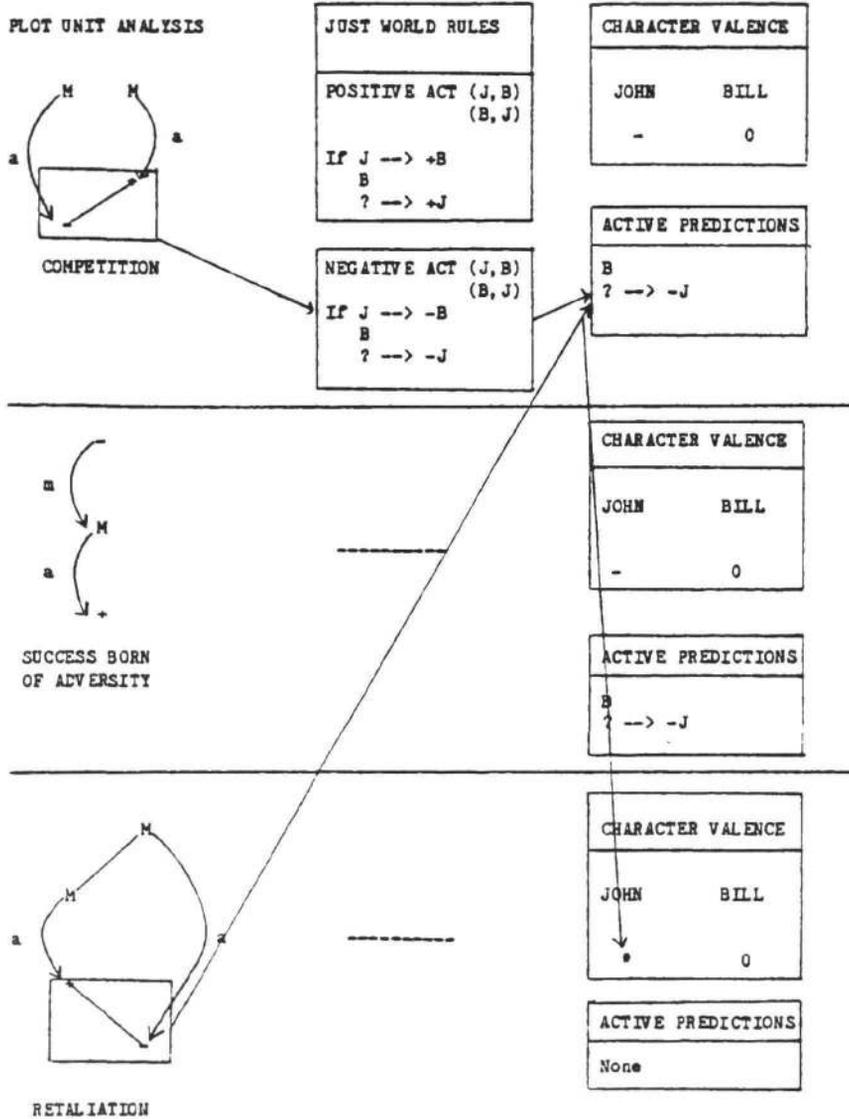
Fig. 1. Multi-level analysis of the "COMSYS Story"

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