Ethical Understanding: Recognizing and Using Belief Conflict in Narrative Processing

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Abstract

Belief conflict patterns (BCPs) are knowledge structures representing the understander's moral attitude toward problematic interpretations of the events in a story. These structures are used to model interest in stories by contrasting the understanding of stories to the system's beliefs about the characters and what they have done. Once recognized, BCPs provide a framework for interpreting the rest of the story, and a basis for identifying the theme of the story. The representation of reasons for the attitude that the understander has of characters are called **character assessments**. Character assessments form the basis for BCPs by giving the understander a prior attitude under which to judge the character's actions. BCPs organize the subjective reasons that the understander has for why a goal success/failure for a character should or shouldn't have occurred, and these reasons provide support for the problematic interpretation of the story events. A process model for BCP recognition and how thematic resolution is accomplished is presented. The role of BCPs in a program that models the interpretive understanding of a short ironic story is described.

1 Introduction

Previous natural language systems for robust story understanding (e.g. BORIS [Dyer, 1983], PAM/PANDORA [Wilensky, 1983]) have relied on modeling the goals and planning of story characters to provide inferences and the thematic elements of the story. A fundamental component of story understanding has been left out of these models: the influence of the reader's moral judgements about the story character and their actions. By modeling the reader's attitudes and judgements an additional dimension is added to the story understanding process, resulting in improved attention direction and thematic understanding.

A reader is drawn into a story by developing strong attitudes about what is being read. These attitudes are a measure of the reader's *interest* in the story. A class of strong attitudes are invoked when the reader makes a normative judgement that story characters are doing things that are morally wrong. Consider the following story beginning:

The Gelignite Story[1]

> Two men on a hunting trip captured a live rabbit. They decided to have some fun by tying a stick of dynamite to the rabbit. ...

To recognize the immorality of the men's intended action, the following inferences have to be made: (1) that the two men are going to blow up the rabbit, (2) that they will be entertained by watching the rabbit blow up, and (3) that they are taking advantage of the power relationship invoked when they captured the rabbit. In addition, the understander has to make the judgement that blowing up the rabbit to watch it happen is an immoral plan. When blowing up the rabbit for entertainment is recognized not only do we want to recognize that it is immoral, but also how the immoral plan is achieved, and what allows the immoral plan to be pursued.

Recognition of the immorality of the two men's plan is a *belief conflict* for the reader. The belief conflict centers around the relationship between the two men and the rabbit, and how the men are taking advantage of that relationship. The conflict is that the reader knows that the men are taking advantage of the rabbit to achieve their goal, and that it is wrong to take advantage of the rabbit. The belief conflict has three elements: (1) the violation of the moral obligations associated with the captor/captive relationship, (2) the goal success that the men are planning for, and (3) how the relationship violation provides the goal success.

This structure is one of a class of interesting abstract structures called **belief conflict patterns** (BCPs). BCPs represent the subjective reasons that the reader has for believing that something in the story shouldn't have happened, or that something else should have. In *The Gelignite Story*, the active BCP is BCP:Taking-advantage: a power relationship violation that is used to achieve a goal success.

Now consider the continuation of the story:

The Gelignite Story (part2)

> ... They lit the fuse and let it go. The rabbit ran for cover under their truck.

When the dynamite blows up, the rabbit and the two men's truck blow up along with it. The destruction of the truck is ironic because the two men had been expecting to be entertained by watching the rabbit explode, but

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[1] A version of this story appeared in [Bendel, 1985] credited to the *Adelaide Advertiser*. Its origin is probably apocryphal. Gelignite is Australian for dynamite.

instead they had their truck destroyed. In addition, the destruction of the truck is a *resolution* to the belief conflict. Because of the understander's belief that blowing up the rabbit was an immoral plan, the destruction of the truck can be seen as retribution. By understanding the story ending in terms of the belief conflict, the resolution can be used to reinforce and refine the moral belief that led to the belief conflict. In *The Gelignite Story* that belief is that it is wrong to take advantage of relationships, because the injured party may be motivated to retaliate. The story shows that even if the injured party *isn't* motivated to retaliate, retribution may occur nonetheless.

Belief conflict patterns formalize the notion of moral understanding problems into a knowledge structure that can be used in story understanding. These knowledge structures have five purposes:

- They represent why the story is interesting.
- They organize the reasons for the belief conflict.
- They resolve coherency problems.
- They direct attention in understanding the story.
- They provide a framework for recognizing theme.

A program that reads *The Gelignite Story* (called THUNDER – THematic UNDerstanding from Ethical Reasoning) has been implemented to test the efficacy of belief conflict patterns. By making inferences based on moral reasoning, the program can limit processing to how the story events relate to the active moral setting.

2 Belief Conflict Patterns

Belief Conflict Patterns (BCPs) are structures that represent the understander's attitude toward the events in a story. A belief conflict is the situation that occurs when the reader feels that something shouldn't have happened for moral reasons. The conflict is between the reader's *understanding* of the story and his *ethical evaluation* of the characters and what they have done. A belief conflict pattern is an abstract structure that organizes the reasons supporting each side of the conflict. On the understanding side, the BCP represents what happened in the story in terms of goal and plan knowledge. The ethical side contains the reasons for the problematic moral interpretation.

BCPs represent problematic interpretations involving ethics and morals, rather than problems with understanding the physical world. Story themes are generally insights into human behavior or interpersonal relationships. Since ethics are heuristics for good moral behavior and BCPs represent ethical violations, the resolution of the belief conflict is thematic.

BCPs are constructed out of opinions about people, goals, plans, actions, and events. There are four general classes of BCPs: (1) good things happening to bad people, (2) bad things happening to good people, (3) good people doing bad things, and (4) bad people doing good things. The goodness or badness of a character is the reader's *attitude* toward the character. Attitudes about characters form the basis for BCP recognition by providing prior knowledge under which the events of the story can be interpreted and reasoned about.

2.1 Representing Attitudes about Characters

When people read about story characters they form normative judgements about the characters. The reasons for these judgements are represented by *character assessments*. There are three types of character assessments:

1. **Virtuous positive:** how the character achieves goal successes
2. **Sympathetic positive:** why the character suffers goal failures
3. **Negative:** how the character causes goal failures.

Positive assessments are associated with empathetic characters. Characters that solve other character's goal failures, or exemplify moral principles have virtuous positive assessments. This assessment of a character has two components: (1) the types of goals that they can achieve, and (2) a planning situation where the assessment is used. The difference between the assessment of smart people and lucky people is that smart people will have achievement goal[2] successes from intellectually demanding planning situations, while lucky people will have delta goal successes from unexpected events.

Sympathetic positive assessments are for characters that suffer goal failures that are not their fault, and have one component: a goal failure for the character that wasn't caused by them. A blind person is going to fail some goals that involve identification of objects, not because of inept planning, but because they weren't granted sight.

Negative assessments are made when a character causes goal failures for others. A negative assessment has two components: (1) the goal of another party that failed, and (2) the plan of the character that caused the goal to fail. The character's plan is included in the assessment to capture the intention of the act causing the goal failure. Matching the intention of the character to the goal that they caused to fail is used to measure the strength of the negative attitude. When unimportant goals intend plans that cause large goal failures, such as spending the rent money on lottery tickets, there is a higher negative assessment. The goal match can also mitigate the negative assessment, such as when people steal food to feed their starving children.

The components of the assessments provide methods for recognizing them when they occur in stories. When characters plan to achieve the goal of another character and the goal involves risking one of their own goals, a virtuous positive assessment is recognized. Similarly, when a character's goal fails, and the goal failure is not the character's fault, a sympathetic positive assessment is built. When goals fail or plans are intended, checks are made for potential goal failures and possible negative assessments.

Character goals have been modelled by associating expectations about the goals with person desciptor knowledge sources (e.g. Schank and Ableson's [1977] character themes and Carbonell's [1980] goal tree model of personality traits). To make character assessments it is neces-

[2]The goal taxonomy is borrowed from [Schank and Abelson, 1977]. Achievement goals are a motivations to attain valued acquisitions or social positions. Other goal types are preservation, enjoyment, satisfaction, crisis, and delta goals.

sary to extend the expectation knowledge with knowledge about the reader's moral attitude toward how goals are achieved and how goals fail. Assessments are associated with character themes and personality traits, and goal successes and failures that occur in the story are checked for assessments. For example, when the rabbit is captured in the first sentence of *The Gelignite Story*, the rabbit suffers a preserve-personal-freedom goal failure. This goal failure causes a sympathetic positive assessment to be built for the rabbit, and a negative assessment to be built for the two men because they caused the goal failure.

Another source of goal information in stories are relationships that are invoked in the stories, such as 'lovers', 'student/teacher', and 'employee/employer'. In *The Gelignite Story*, the captor/captive relationship is recognized when the men capture the rabbit. The goals in this relationship are represented as *moral obligations* – the goals that each party has as a result of the relationship. In the captor/captive relationship, the captor has the goal of protecting the health of the captive, and the captive has the goal of escaping. The reason for the captive's goal is that the captive/captor relationship already has violated a preserve-personal-freedom goal. If the captive *doesn't* try to escape, there is a belief conflict because they should be motivated to do so. Examples of this belief conflict are present in "Stockholm syndrome" stories, where the captives in hostage situations begin to empathize with their captors, as in the case of Patty Hearst and the SLA.

2.2 The Sources of Belief Conflict

Good things happening to bad people is one class of BCPs. A instance of this class gets recognized when a character who has negative assessments has a goal success. Here are example instances of this class:

S-1: An arrogant person winning the state lottery.

S-2: A coward was given the Congressional medal of honor.

S-3: Union Carbide announced enormous profits in the wake of the Bhopal disaster.

In each of these cases the understander believes that the character shouldn't have a goal success because of the character's negative assessments. Just having a negatively assessed character achieve a goal success is slightly interesting because there is a reason that the character should not be achieving goal successes. However, not every negative character having a goal success is an interesting belief conflict:

S-4: A bank robber never got caught.

S-5: A bully got an A on a test.

Example **S-4** shows that even though there is an expectation associated with the negative assessment (a bank robber is expected to rob banks), there is a belief conflict when the expectation is realized and successful. Example **S-5** shows that even with no relationship between the negative assessment and the goal success, again the situation is slightly interesting. To recognize why examples **S-1**, **S-2**, and **S-3** are *more* interesting, the interesting relationships between the negative assessment and the goal success have to be represented.

Examples **S-1**, **S-2** and **S-3** can be represented by the following BCPs:

1. BCP:Fuel-to-the-Fire – The goal success furthers the ability of the character to do acts corresponding to their negative assessment. An arrogant person causes goal failures for other people by belittling other people's accomplishments and possessions compared to their own. Winning the lottery allows the arrogant person to get better possessions and become more arrogant.
2. BCP:Violated-Enablement – A fortuitous goal success when a negative assessment of the character would cause an enablement for the goal to fail. Cowards cause goal failures for themselves and others when they back down from challenges, and an enablement for getting the medal of honor is a brave act.
3. BCP:Undeserved-Resource – The goal success provides a resource that could be used to prevent the goal failures in the negative assessment. To recognize this BCP in **S-3**, the understander has to believe that Union Carbide's negligence in providing safety equipment was responsible for the Bhopal disaster. The goal success of "enormous profits" could have been used to prevent the disaster.

Other patterns in the BCP class of good-things-happening-to-bad-people include:

4. BCP:Unnecessary-Goals – The goal achieved corresponds to the motivating goal of the negative assessment. Example: A glutton got locked in a candy store.
5. BCP:Violated-Character-Theme – The plan used to achieve the goal contains acts that violate expectations contained by the planner's character theme. Example: A greedy Bank President embezzled money to support his cocaine habit.

3 BCP Recognition

To build the conceptual representation of the story, THUNDER uses the *explanation-based* model [Dyer, 1983; Wilensky, 1983], where the conceptual representation for a story is constructed by explaining each new event of the story in terms of the conceptual representation so far. The model works by organizing knowledge into three hierarchical levels: act/event, goal/plan, and theme (in order of increasing abstraction). The explanation process works bottom-up; when a new event cannot be explained by the currently active knowledge structures in the representation, the program attempts to apply knowledge from the next higher level to explain the failure. These new knowledge structures provide top-down explanations for subsequent inputs. BCPs are a part of the thematic explanation level.

Since the heart of a BCP is a goal success or failure, the recognition of goal success or failure is the starting point for the BCP recognition process. The outline of the top level processing of the program is:

1. Parse a sentence into Conceptual Dependency [Schank, 1973] actions and events.

2. Search for explaining goal/plan expectations from the active MOPs[3].
3. If none are found, infer new MOPs to explain the action. For each new mop, do the following:
   a. Check for planning problems that will cause goal failures. If found, check for BCPs based on active positive assessments. If there is no BCP, build a negative assessment for the planner.
   b. For goal failures caused by the plan, check for BCPs based on active positive assessments. If no BCP, build a sympathetic assessment for the actor having the goal failure and a negative assessment for the planner.
   c. For each goal success, check for BCPs based on active negative assessments.

Existing MOPs that have been used to understand the story are used in step two to explain events at the goal/plan level. When new goals and plans are inferred, the system needs to continue to see if there are any reasons for why the goal shouldn't have succeeded. Step three moves the system from goal/plan reasoning to belief reasoning, matching the beliefs of the understander to the representation for the events of the story.

To illustrate how BCPs are recognized, and why ethical evaluation is important, consider the second sentence of the gelignite story:

> They decided to have some fun by tying a stick of dynamite to the rabbit.

This is a planning problem: How does one have fun by tying a stick of dynamite to the rabbit? An analogue is PAM's [Wilensky, 1983]:

> Willa was hungry. She picked up the Michelin Guide and got in her car.

For PAM, the problem was to find a plan for hunger that involves reading the Michelin guide. In THUNDER, the problem is to find a plan that involves the rabbit and dynamite, and find the reasons the understander should feel that the men are doing something wrong.

The program uses the knowledge that dynamite can blow things up, and here the thing that will be blown up is the rabbit. The intentional knowledge about blowing things up (i.e. that blowing things up is a means of destroying them, and that you have to light the fuse and get away) is represented in the MOP M-Blow-Up.

Since the two men are planning to blow up the rabbit, a negative assessment is built for causing the death of the rabbit as a part of their plan. But the plan for blowing up the rabbit results in a dead rabbit, not entertainment for the men. By searching on the elements of M-Blow-up, the program finds that the event of blowing up the rabbit can be used for entertainment in the MOP M-Sado-Pleasures: the knowledge that some people get their jollies by watching animals die grisly deaths.

[3]The goal/plan level of the representation uses Memory Organization Packets (MOPs) [Schank, 1982] to represent intentional information about character motivations and what they are achieved. The implementation of MOPs in THUNDER is a semantic net of acts, events, plans, and goals based on [Dyer, 1983]

When the program recognizes that the men will have a goal success by watching the rabbit blow up, it initiates the search for a BCP. Since blowing up the rabbit is a violation of their moral obligation in the captor/captive relationship, the program builds the BCP:Taking-Advantage – the two men are taking advantage of the relationship to achieve a goal success. When the goal failure for the rabbit is processed, the converse BCP BCP:Taken-Advantage-Of is recognized. The first BCP represents why is is wrong for the two men to blow up the rabbit, the second represents why is is wrong for the rabbit to be blown up. In this process, the program is lead to the belief conflict by checking the story for potential moral problems.

4 Thematic Resolution

When a negative character has a goal success, the reader will be looking for the story to explain why the goal success isn't really a goal success, or what goal failures the character will suffer as a result of the goal success. In this way recognition of a BCP constrains future processing by restricting the understanding of events to how they relate to the established BCP.

At the end of *The Gelignite Story*, the rabbit is sitting under the two men's truck with a lit stick of dynamite tied to its back. Because of the unresolved belief conflicts, the program continues processing by making inferences about what happens next from the active Mops. When the dynamite blows up, the rabbit dies and the men's truck is destroyed. (The irony recognition in THUNDER for *The Gelignite Story* is discussed in [Reeves, 1986; Dyer *et al.*, in press]). The preserve-possessions goal failure for the men is interpreted as a resolution to the belief conflict. The program then continues to find the theme of the story – what the goal failure tells us about why it is wrong to take advantage of people.

To resolve the belief conflict, the realized goal failure is contrasted to the support for the BCP. For BCP:Taking-Advantage, the reasoning is that:

> You shouldn't take advantage of relationships, because the person you take advantage of will be motivated to retaliate.

The program applies this rule to the goal failure and finds that the rabbit wasn't running under the truck to get revenge, but to get away from the men. Since the rabbit didn't intend to blow up the truck, the program traces the steps that led the rabbit to run under the truck: (1) their truck was blow up by the rabbit being under their truck, (2) the rabbit ran under the truck to get-away from the two men, and (3) the men had planned on having the rabbit transport the dynamite away from them before it blew up – an enablement condition of M-Blow-up. The expected event that caused the belief conflict to be recognized (blowing up the rabbit) is the event that leads to the resolution. Finding this, the program abstracts a theme:

> **It is wrong to take-advantage of people because how you take advantage of them may result in a goal failure.**

5 Comparison to Related Work

Since the character assessments give reasons for the understander's ethical evaluation of a character, they can also be used to derive the reader's affect toward the characters. People feel angry toward the two men in *The Gelignite Story*, and sympathy for the plight of the rabbit. Brewer and Litchenstein [1982] have shown that reader affect is a component of what people consider "storyness", so making character assessments would appear to be a integral part of the story understanding process.

Belief conflict patterns differ from previous approaches in that the role of the understander is *explicitly* represented. In TAUs [Dyer, 1983] and Story Points [Wilensky, 1982], the role of the understander was captured through the knowledge structures that were used in understanding an episode (goal relationships, authority and interpersonal relationships, etc.). Alvarado, Dyer and Flowers [1986] have shown the utility of representing beliefs explicitly to recognize argument structures, and this insight is encorporated in the representation of belief conflicts and themes. Belief conflict patterns represent anomalous understanding situations, and motivate explanations in the same way as Schank's explanation questions [1986]. The type of anomalous understanding represented by BCPs is a form of cognitive dissonance [Festinger, 1957] where the events of the story are an attack on the understander's belief, and motivate a reduction of the dissonance by finding a resolution to the belief conflict. BCPs are used to interpreted the rest of the text in the same way as opinions are used in the doxastic/strategic model of [van Dijk and Kintsch, 1983; van Dijk, 1982] of discourse comprehension.

The problem with thematic processing based strictly on explaining goal and planning failures (as in CRAM [Dolan, 1984]) is that it fails to capture the understander's ethical interpretation. For example, if we try to explain the two men's goal failure when their truck blows up as simply a planning failure, we get into all sorts of weird explanations associated with avoiding having the rabbit run under their truck, such as breaking the rabbit's legs so it can't run to their possessions, or taking it out in the middle of a field away from their campsite. This type of explanation is not normally considered by people when reading the story.

6 Implementation Details

THUNDER is written in T [Rees *et al.*, 1984; Slade, 1987] and runs on Apollo workstations. It uses the Rhapsody representation system [Turner and Reeves, 1987]. A run of *The Gelignite Story* from parsing through generation of the story themes with full tracing is about 2000 lines and takes 327 seconds of CPU time on an Apollo DN3000. Independent of Rhapsody, THUNDER has 4.8K lines of T code. For natural language I/O, THUNDER uses a phrasal parser and generator based on the pattern-concept lexicon [Jacobs, 1985; Arens, 1986], with 300 entries in the lexicon. In addition to *The Gelignite Story*, THUNDER processes the other ironic stories from IRON-FINDER [Reeves, 1986; Dyer *et al.*, in press]. There are 7 MOPs used in the representation of *The Gelignite Story* story: M-Blow-Up, M-Sado-Pleasures, M-Get-Away, M-Capture, M-Injury, M-Revenge, and M-Damages.

7 Future Work

Recent work in the study of moral development (e.g. the cognitive developmental theory [Kohlberg, 1981] and social interactional theories [Turiel, 1983; Haan *et al.*, 1985]) have emphasized the role of psychological constructions in the determination of morality. The focus of the research has been on reasoning involving moral dilemmas, and the determinants of moral developmental stages. So far, our research has been concerned with the more mundane aspects of operationalizing moral reasoning and using moral judgements to control narrative understanding. One future direction to pursue is to implement different structural reasoning models [Lickona, 1976, p. 9], and test their behavior in story understanding.

Central to this project is a representation for the *belief system* [Abelson, 1973] of the understander, the ethical rules that the understander is using to evaluate situations. Carbonell [1980] has shown how goals trees can be used to represent ideologies to interpret events differently based on the goal tree of the understander. Recognition of a BCP in a story shows more than the orientation of the program to important goals, but to interesting properties of the situation, and differing the interests will result in the recognition of different BCPs. This can be shown by having our system process input stories with multiple BCPs to show how the differing interests are represented, how more than one theme can be recognized, and how the different BCPs effect later understanding.

8 Conclusions

Belief conflict patterns represent understanding problems involving moral judgements by the understander about the actions in the story. In a story understanding system, they (1) give the system something to search for to be interested in, (2) organize the reasons for the belief conflict by contrasting the understanding of the story to a moral evaluation, (3) provide a basis for the resolution of coherency problems in the text, (4) direct attention in interpreting the narrative, and (5) can be used to find the theme of the story. Finding a BCP constrains the explanation to story events relating to the belief problem.

Character assessments represent the moral beliefs of the understander about story characters. They provide reasons for the affective orientation of the understander toward the characters by providing an evaluation of the character's goal/plan expectations and the effects that they have. Character assessments can be used to rank attitudes, with stronger attitudes being more interesting, and processing can be directed toward the more interesting character themes and personality traits.

The purpose of this research is to model the reader's role in story understanding. During story understanding, the reader is making *ethical* judgements: value judgments (good and bad) about characters, and obligation judgments (right and wrong) about story actions. To model the ethical reasoning that story understanders do, it is necessary to model how these judgements are motivated, and the reasoning that is done when these judgments are made. The payoff from ethical modeling of the story understander is that ethical judgements provide constraints on the story understanding search space. Ethical lessons

are a form of theme, the purpose for reading the story, and ethical concepts are needed to derive an ethical moral from a story.

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