Why Good Writing is Easier to Understand

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ABSTRACT

Writing is "good" when it anticipates the knowledge that its readers will bring to it--the questions they will implicitly ask--and tailors its content and form accordingly. A large part of this tailoring involves the careful use of "discourse clues": choices of wording, patterns of phrasing, and specific discourse connectives that signal the structure and intent of a text to the audience. We begin by examining in instance of bad writing, rewriting it to illustrate the importance of discourse conventions in avoiding false interpretations. We continue with an example of a larger scale discourse pattern, and show how the recognition of such patterns captures important inferences "for free", making a general-purpose deduction component largely unnecessary. The paper concludes with a brief discussion of the design of a language understanding system presently under development that uses discourse clues and commonsense reasoning to direct the text understanding process in a flexible an opportunistic manner.

1. Introduction

In our research on language understanding we have concentrated on identifying those features that distinguish good writing from bad writing. What is it that makes good writing so easy to understand? Why does good writing "flow" and bad writing "stumble"? How does a good writer craft sentence, paragraph, or story so that the reader makes the intended inferences?

A good writer is not simply a good grammarian. In addition to understanding the rules of syntax, he knows how to use the right word at the right time and how to order the constituents of his discourse to achieve the desired effect in his reader. Good writing does not simply tell you something you already know, but typically tells you something new and from a novel point of view. Com monly in the past, efforts to model language understanding have focused on the single sentence, the oddball or "garden path" paragraph, and have discarded the details of discourse structure. Many of the example sentences selected for analysis and representation are examples of bad writing taken out of context and denuded of all their discourse clues. It is no wonder these types of sentences are difficult for a program to comprehend; we have a hard time ourselves with such examples; and in this, we believe there is a lesson.

In our research we have concentrated on examples of good writing in order to discover how careful word selection and discourse construction facilitate comprehension. For our material we have used real world texts (Wall Street Journal, New York Times, UPI) written by skilled writers for real world readers. By analyzing "natural" texts we have tried to determine the manner by which discourse structures focus the attention and direct the inferencing of the reader. We have found that texts have embedded within them numerous and predictable clues as to how the content of the text is to be represented and interpreted, clues whose controlling influence may become obvious only in their absence, as we show in the next section.

2. An Example of Poorly Written Text

In reading a text one makes a number of standard but essential assumptions: the author is not trying to deceive or mislead you; you and the author share not only a common ground of knowledge, but share common notions of plausibility as to the manner and place in which things are typically done and the causes and motivations for events and actions. If any of these conditions or assumptions are violated and are not so noted by the author, then understanding becomes an onerous, if not impossible, task. In some cases, such violations will occur through poorly constructed discourse or discourse taken out of context. From the standpoint of creating a language understanding program, these types of errors present unresolved issues in frame determination because they either supply insufficient information to select among candidate frames, or they supply misleading information that leads to the selection of incorrect frames. The following example from Collins et al. (1978) illustrates how a text can mislead a reader into making implausible interpretations. A plausible or acceptable understanding of the paragraph becomes apparent only when the final sentence is read, and then only with some difficulty. Collins constructed this paragraph deliberately as part of a psychological study of "garden path" effects in text. Charniak (1978) used it to illustrate the difficulty of using local evidence to select the appropriate frame.

> He plunked down $5 at the window. She tried to give him $2.50, but he refused to take it. So when they got inside, she bought him a large bag of popcorn.

One of the reasons why this passage is so difficult to comprehend--for human beings as well as programs--is that is has not only been stripped of helpful discourse clues, but those clues that are present are used to deliberately confuse the reader. Hence, we are given not only insufficient information, but false information. Our commonsense reasoning about the plausibility of the why, who, and where of the episode contained in the text suceeds only after we retrieve a somewhat esoteric frame on male/female financial transactions in emancipated relationships. (It is doubtful that this piece of text would be comprehensible to a traditional European or American.) Notice that misleading "focus" words (words that stress an attribute of an action or an entity) are used in a foregrounding role: "he <u>plunked</u> down <u>$5</u> at the <u>window</u>". The inclusion of these words in the lead-in sentence quite naturally creates the expectation of a betting booth; one does not normally "plunk down" money at a ticket booth, although such deliberate actions are quite typical for placing a bet. Notice too that the "she" is ambiguous and misleading--creating the expectation

of the ticked taker, but violating that expectation with the problematic "he refused to take it". At each point we are being primed for a particular interpretation, and then being confronted with a phrase or action that violates our expectation. This episode becomes plausible, and thus comprehensible, only once we establish not just the place in which it occured, a movie theater, but the motivation for the refusal of the change as well. Consequently, an effective rewriting of this text would have to first highlight the place of the episode and the reason for it taking place. For example:

> Janet was a highly independent woman and Jack a stalwart traditionalist. When they were at the movies last week, Janet tried to pay for her ticket, but Jack refused. So when they got inside, she bought him a large bag of popcorn.

Notice that in this rewriting of the text many of the details of the previous passage are omitted such as, plunked, $5, window, and $2.50. From the standpoint of the story these are extraneous details which should not be included or marked since they do nothing to improve comprehension. A part of good writing entails the ability to discriminate between those things that further com prehension and those that needlessly distract the reader.

3. Discourse Clues

The model of language comprehension that we are using assumes that writing and speaking are intentional acts whereby the speaker or writer first attempts to reference, either explicitly or implicitly (i.e. via the context of the text), a common body of knowledge and then selects and orders his words and phrases to direct the reader to the desired interpretation. In order to do this effectively, a writer must "know" his audience and must have some model of how they are likely to interpret what he is writing. The writer is seen as feeding the reader a stream of clues, some of which are important in and of themselves, and others which are instrumental to creating expectations in the reader's mind as to what is likely to follow. Some of these clues are contained in the words themselves, words that stress a particular attribute or manner such as "plunked" as againt the more standard, "paid" or "put down. Such words are "trigger words" in that they highlight a particular attribute and are intended to trigger specific frames or inferences. Equally important are positional clues that either reference a general organizing frame by foregrounding and highlighting a constituent, or discriminate between frames or slots through explicit devices for directing inferencing such as, contrast markers, binders, deictic markers, comment markers, conclusion markers, and equivalence markers.

Just as morphological markers indicate syntactic structure at the sentence level and below, these discourse clues indicate conventional patterns of information on a larger scale. Consider the passage below from the end of a UPI wire story on the political situation in the West Bank of Lebanon.

> "... But the protests in the occupied territories continued. They erupted March 18 following the Israeli dismissal of three elected West Bank mayors and their concilmen as suspected Palestinian Liberation Organization puppets.
>
> In the next six weeks, 10 Palestinians were killed and about 90 wounded by Israeli gunfire. Military souces said an Israeli Army officer and a Druze border policeman died, and 33 troops and 37 other civilians, including four tourists, were wounded.

The initial "but" plus the paragraph break indicate a potential change in the topic of the article, which is immediately confirmed by the reference to an object never mentioned before that point, "the protests". The fact that a definate determiner is used signals that this is a subject that people who follow current events should be familar with.

By the time we are halfway through the second sentence of the passage, we can recognize the use of a common rhetorical pattern; one that, if confirmed, will yield a functional organization for the passage that we will in effect have gotten "for free", thereby relieving us of the need for a general purpose inferencing engine to deduce the same links. The rhetorical pattern is: <1. established event announced to be still going on> <2. review of how it started> <3. summary of what has happened since then>. Items one and two match well with the first and second sentences of the passage respectively, suggesting that the third item will follow. This suggestion is immediately confirmed by the author's use of a syntactically marked (because it is removed from its default position at the end of the clause and therefore is probably important), very explicit phrase, "in the next six weeks". This discourse clues gives us the right to interpret the events described in the rest of that paragraph as caused by the protests, a fact that would otherwise require explicit deduction.

In addition to providing the reader with an ordered sequence of discourse clues for referencing and constructing frames, discourse also provides "error correction" clues to help the reader determine whether he is properly comprehending the discourse. As Charniak (1978) and Minsky (1975) have observed, understanding entails generating and confirming hypotheses about what is being transmitted in the discourse. A good writier anticipates those points at which a reader will naturally expect a confirmation to a hypothetical interpretation by placing the expected interpretation in a focused position or by using explicit marker words such as "therefore". The reader in turn continuously monitors what is being said against what has been said and what was expected. He examines each new piece of text for its plausibility in terms of his commonsense understanding of the topic domain. The plausibility of any given interpretation is dependent upon the reader's commonsense model of the topic domain. What constitutes "commonsense" is likely to be highly topic and culture specific; on need only to contrast the Vermont farmer's notion of commonsense to that of the New Yorker on the upper East Side to appreciate the vicissitudes of commonsense. On the other hand, the types of questions or inferences that are made in commonsense readoning seem to be quite universal. They are the same types of questions that all good journalists much answer when writing a story: who, when, where, why, and how. These are the types of questions that all readers ask when reading a story to see whether what they have understood is what the author had intended. the task of a good writer is to avoid straining the credulity of his audience by pitching or targeting his remarks at the appropriate level of commonsense reasoning for his particular audience.

4. Research Status and Projected Design

Our interest in discourse clues was sparked by our experience with a prototype systems for locating information of interest in real texts (Clippinger, 1982). We were shocked to find that the conventional design of the system (a bottom-up, syntactic parser feeding a feature-based semantic component and matcher) led to its downfall on real texts: a 25 word introductory sentence from the New York Times yielded 864 alternative parses, even though its structure was perfectly obvious to a human reader. We resolved that no purely syntactic, knowledge free parser could be allowed to dominate the pipeline of a language understanding system.

Our current efforts are directed at developing and implementing an architecture for language understanding that corrects the failings of our previous design and can take advantage of discourse clues. The content-blind syntactic parser is relegated to a "go for" role, identifying and packaging up only those consitutents whose identification can be guarenteed (e.g. pp's, np's up to the head noun, simple clauses with unambiguous verbs).

Processing the input in parallel with this restricted parser is a phrasal lexicon. It recognizes highly specific content words, idioms, and stock phrases directly from the input word stream, and immediately causes the associated concept (frame) to be instantiated.

The system's awareness of what it is reading is to be organized as a kind of "chart"–identical in conception to the chart of the bottom-up parsers, but based upon instantiated frames and discourse patterns of various scopes, rather than just sentence-level syntactic constituents. The chart will be used as it is in Earley's algorithm, where partially completed "constituents" (at any level) act as predictions of what kinds of concepts and linguistic constructions may be seen next, as well as serving as filters insuring that only predicted concepts are ever proposed by the parser or phrasal lexicon.

Once the topic of the text has been determined (usually on the basis of very specific substantives such as "Lebanon" or "West Bank"), the system draws on its generic frame systems for that topic, its knowledge of current events there, and its stored expectations about what interesting developments could occur and "primes" the core vocabulary that could be used to write about it. This puts the phrasal lexicon "on the lookout" for these words, and establishes direct links from them to their corresponding frames; when one of them is seen, e.g. "protests", its frame is instantiated and fit into the chart in a way that accomodates what is already predicted. (Note that filtering occurs as well. The word "protests" can be a verb as well as a noun, but this reading is incompatible with the syntactic context established by the determiner "the" and so will never be considered by Earley's algorithm.)

As the two of us are deeply interested in the problems of natural language generation, we expect always to be working with domains and topics which our programs will be able to talk about themselves as well as read what others write about them. We regard this "priming" technique above (which can apply to marked turns of phrase and discourse patterns as well as single words) as an intriguing way to explore the ties a program has between its linguistic knowledge about generation and about understanding. The strongest hypothesis says that the two processes employ the identical grammar and set of conceptual associations; we will test this by having the understanding system ascribe to authors the same motivations for the form of the texts that they write as it would have had itself, and seeing whether the results are credible.

Overall, the control structure of the system will be best-first and opportunistic, adjusting itself to always use the most confident knowledge source to direct the processing. All components will be only loosely coupled, with all communications between them first posted on an agenda where their value and certainty can be evaluated relative to others. The payoff of this design (indeed the payoff of attending to discourse structure at all, since the same information can usually be deduced by an inference engine working only from the concepts directly instantiated by the text) is that it should be able to arrive at its understanding quicker by being able to use specific clues (e.g. primed words and discourse patterns) to shunt around general purpose processing such as compositional semantics and deduction, relegating these components to a confirmation role only.

5. Future Research

The development of this understanding system will be undertaken at Brattle Research with support from U.S. Army CECOM. We anticipate that much of the grammar will be developed at UMass by capitalizing on the English surface structure analysis being elaborated there for use in the language generation system, "Mumble" (McDonald, 1983). Much of our initial set of discourse clues will be extracted from Clippinger (1977).

6. Acknowledgements

A good portion of this research was made possible through a contract (DAAB07-82-C-J070) from USACECOM. We have benefited from discussions with Rich Walsh and from members of the Yale Artificial Intelligence Group.

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