

LANGUAGE GENERATION 7:

PRAGMATICS: THE ROLE OF STYLE IN LANGUAGE

NL GENERATOR CONTROL BY 'SOFT PLANNING' USING STYLE

Theme

This lecture explores a dimension of language not usually discussed in NLP: the pragmatics. What do pragmatics communicate, and how is pragmatics embedded into language?

The role of style. The control/management of style, illustrated using PAULINE, a language generation program that produced variations of the same basic input under different pragmatic (speaker, hearer, and situation) settings. PAULINE was a complete language generator, including the three stages of text planning, sentence planning, and realization, and describes how the need to handle many decisions together, in order to create stylistically coherent and pragmatically effective text, some additional notion of style is required.

Given the nature of style, typical top-down hierarchical planning does not apply. A different method of planning, opportunistic and incremental, is required. A discussion of this.

Summary of contents

1. What is style?

The question: why and how is it that we say the same thing differently to different people or to the same person in different situations? The answer: simultaneous communication at various levels.

What differences (not the formal ones, but what the reader takes away) exist between these two paragraphs?

In early April, a shantytown — named Winnie Mandela City — was constructed on Beinecke Plaza by several students so that Yale University would divest from companies doing business in South Africa. At 5:30 am on April 14, it was destroyed by officials; also, at that time, the police arrested 76 students. The students requested that Yale give the students permission to reassemble the shantytown while several local politicians and faculty members expressed criticism of Yale's action. Finally, the university permitted the students to reconstruct it and concurrently, Yale university announced that a commission would go to South Africa in July to examine the system of apartheid.

Yale University punished a number of students for building a shantytown on Beinecke Plaza by arresting 76 students and tearing the shantytown down one morning in April. The students wanted Yale to divest from companies doing business in South Africa. Finally, the university gave in and allowed the students to rebuild the shantytown.

How would one investigate this issue computationally? One plan: build a language generation system that can produce not only semantically correct but also *stylistically appropriate* text. That is, go from the input frames and a set of communicative goals into the text that is most semantically *and* stylistically apt, and that therefore will have the desired interpersonal/pragmatic effects on the reader/hearer.

That is the PhD thesis of Hovy: PAULINE system. (Hovy 1987).

2. PAULINE

NL generator that produced text from internal semantic case frame representations:

```
[ :id E1
  :action TEAR-DOWN
  :agent E2
  :patient E3
  :time 86/04/15::05:30
  :location YALE]
[ :id E2
  :type OFFICIAL
  :number >1 ]
[ :id E3
  :type SHANTYTOWN
  :name "Winnie Mandela City"]
```

At 5:30 am on April 14, Winnie
Mandela City was destroyed
by officials
It was destroyed by officials at
5:30 am on April 14
At 5:30 am on April 14, officials
had to disassemble the
shantytown; later, ...
Officials had to remove the
shantytown one morning []

To model the communication situation, PAULINE used the following characterization of the various effects that can be achieved in language:

Reflecting the speaker:

- knowledge of topic — *expert, student, novice*
- interest in topic — *high, low*
- opinions about topic — *good, neutral, bad*
- emotional state — *happy, angry, calm*

Reflecting the hearer:

- knowledge of topic — *expert, student, novice*
- interest in topic — *high, low*
- opinions about topic — *good, neutral, bad*
- language ability — *high, low*
- emotional state — *happy, angry, calm*

Reflecting their relationship:

- depth of acquaintance — *friends, acquaintances, strangers*
- relative social status — *dominant, equal, subordinate*
- emotion — *like, neutral, dislike*

Reflecting the situation:

- time — *much, some, little*
- tone — *formal, informal, festive*
- conditions — *good, noisy*

Now given these parameters, any language production situation requires that the speaker (generator) have a specific set of goals. These can be modeled as follows:

Goals to affect the hearer:

- hearer's knowledge — *teach, neutral, confuse*
- hearer's opinions of topic — *switch, none, reinforce*
- hearer's involvement in conversation — *involve, neutral, leave*
- hearer's emotional state — *anger, neutral, calm*
- hearer's goals — *activate, neutral, deactivate*

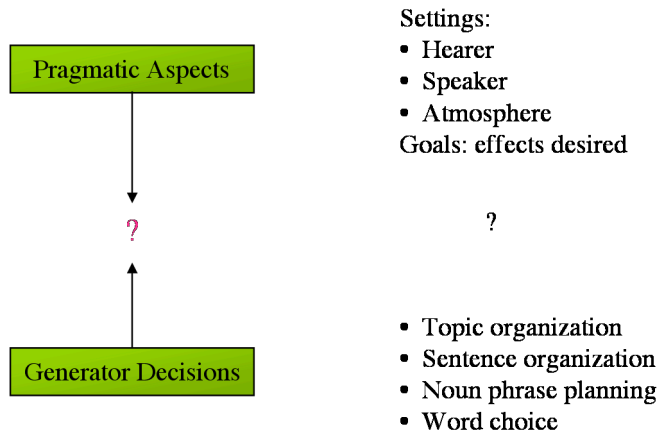
Goals to affect the speaker-hearer relationship:

- emotion toward speaker — *respect, like, dislike*
- relative status — *dominant, equal, subordinate*
- interpersonal distance — *intimate, close, distant*

Dilemma: How to control the low-level text generator decisions given these parameters? There's a many-to-many mapping between each of them and the various generator decisions.

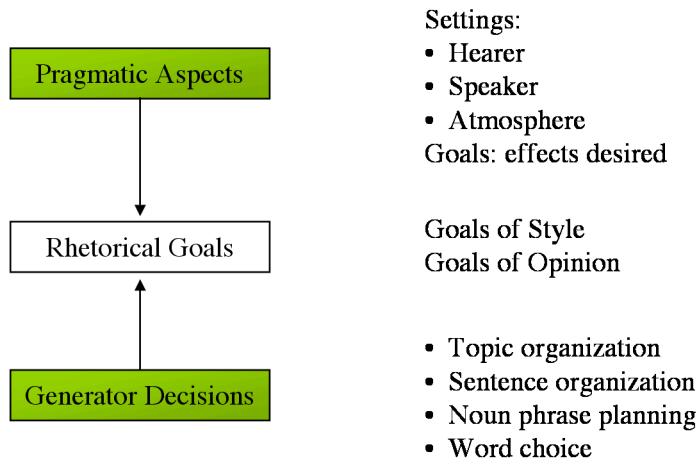
Generator decisions:

- **Topic collection:** collect aspects of initial topic to be new sentence topics
- **Topic inclusion and organization:** reorder, regroup, interpret, juxtapose
- **Sentence organization:** subject, pre-sentence adjuncts, verb, predicate adjuncts and phrases
- **Noun phrase content and organization:** delimit, order
- **Word choice**



The Missing Link: Style

The necessity of an intermediate level of control. Strategies that give rise to styles. The operation of style: controlling ranges of decisions in coherent ways to achieve particular effects.



PAULINE's rhetorical goals of style:

- **formality:** *colloquial, normal, highfalutin'*
- **partiality:** *none, implicit, explicit*
- **force:** *quiet, normal, forceful*
- **haste:** *pressured, normal, planned*
- **simplicity:** *simple, normal, complex*
- **verbosity:** *terse, normal, verbose*
- **detail:** *details, interpretations, both*
- **floridity:** *dry, neutral, flowery*
- **respect:** *arrogant, neutral, respectful*
- **color:** *facts only, with color*
- **timidity:** *timid, neutral, reckless*
- **personal reference:** (two ranges, for speaker and hearer)

How does this work? Need two sets of rules, to model the two mappings (from the goals to the style level, and from that to control the individual generator decisions). Example, using the Rhetorical Goal *Formality*:

The activation RG:Formality:

first, set RG:formality to the value:

- *colloquial*, if tone is *informal*, and depth of acquaintance is *friends* or rel. social status is *equal*
- *normal*, if depth of acquaintance is *acquaintances*
- *formal*, if depth of acquaintance is *strangers*

then, reset RG:formality one step toward *colloquial*:

- if desired interpersonal distance is *close*
- if tone is *informal*

or reset RG:formality one step toward *formal*:

- if tone is *formal* (to be businesslike)

then, *invert* the value of RG:formality if:

- desired H emotion toward S is *dislike*
- desired H emotional state is *angry*

(Or, contrapositive: to make H like you, use appropriate level of formality)

And next, controlling the generator decisions:

Strategies to produce formal text:

To make formal text:

- **Topic organization:** Link sentences (relate, conjoin, or embed)
- **Sentence inclusion:** Place adverbial phrases at sentence beginnings
- **Sentence organization:** Avoid elision ("Joe got more than Pete [did]")
- **Word/phrase choice:** Use nominal forms of verbs, adverbs
- **Word/phrase choice:** Use formal phrases and words
- **Word/phrase choice:** Avoid pronominalization, slang, contractions

To make informal text:

- **Sentence inclusion and organization:** Include at most one adverbial phrase per sentence; place at end of predicate
- **Sentence organization:** Elide words and phrases, if grammatical
- **Word/phrase choice:** Select verbs and adverbs rather than nominal forms
- **Word/phrase choice:** Use informal phrases and words
- **Word/phrase choice:** Pronominalize
- **Word/phrase choice:** Use idioms, slang, and contractions

Examples of operation:

Variations of word choice for formal/informal text:

In early April, a shantytown --- named Winnie Mandela City --- was **constructed** on Beinecke Plaza by **several** students so that **Yale University would divest from** companies doing business in South Africa. At 5:30 am on April 14, it was **destroyed** by officials; also, at that time, the police arrested 76 students. The students **requested** that Yale **give** the students **permission** to **reassemble** the shantytown while several local politicians and faculty members **expressed criticism of** Yale's action. **Finally**, the university **permitted** the students to **reconstruct** it and **concurrently**, Yale university **announced** that a commission would go to South Africa in July to **examine** the system of apartheid.

In early April, a shantytown --- named Winnie Mandela City --- was **built** on Beinecke Plaza by **a bunch of** students so that **Yale would pull its investments out of** companies doing business in South Africa. At 5:30 am on April 14, it was **demolished** by officials; also, at that time, the police arrested 76 students. The students **asked** that Yale **allow** the students to **rebuild** the shantytown while several local politicians and faculty members **criticized** Yale's action. **At long last**, the university **allowed** the students to **rebuild** it and **at the same time**, Yale university **said** that a commission would go to South Africa in July to **study** the system of apartheid.

Variations of sentence content and organization for formal/informal text:

In early April, a shantytown --- named Winnie Mandela City --- was constructed on Beinecke Plaza **by several students so that** Yale University would divest from companies doing business in South Africa. At 5:30 am on April 14, **it was destroyed by officials; also, at that time**, the police arrested 76 students. The students requested that Yale give the students permission to reassemble the shantytown **while** several local politicians and faculty members expressed criticism of Yale's action. **Finally**, the university permitted the students to reconstruct it **and concurrently**, Yale university announced that a commission would go to South Africa in July to examine the system of apartheid.

In early April, **several students constructed** a shantytown named Winnie Mandela City on Beinecke Plaza. **They wanted** Yale University **to** divest from companies doing business in South Africa. **Officials destroyed it** at 5:30 am on April 14. **At the same time**, the police arrested 76 students. The students requested that Yale give the students permission to reassemble the shantytown. **¶** Several local politicians and faculty members expressed criticism of Yale's action. **Finally**, the university permitted the students to reconstruct it. **Also**, Yale university announced that a commission would go to South Africa in July to examine the system of apartheid.

Both sentence content/organization and word choice together:

In early April, a shantytown --- named Winnie Mandela City --- was **constructed** on Beinecke Plaza **by several students so that** Yale University would **divest from** companies doing business in South Africa. At 5:30 am on April 14, **it was destroyed by officials; also, at that time**, the police arrested 76 students. The students **requested** that Yale **give** the students **permission** to **reassemble** the shantytown **while** several local politicians and faculty members **expressed criticism** of Yale's action. **Finally**, the university **permitted** the students to **reconstruct** it **and concurrently**, Yale university **announced** that a commission would go to South Africa in July to **examine** the system of apartheid.

In early April, **a bunch of students built** a shantytown named Winnie Mandela City on Beinecke Plaza. **They wanted** Yale University **to pull its investments out of** companies doing business in South Africa. **Officials demolished it** at 5:30 am on April 14. **At the same time**, the police arrested 76 students. The students **asked** that Yale **allow** the students to **rebuild** the shantytown. **Several** local politicians and faculty members **criticized** Yale's action. **At long last**, the university **allowed** the students to **rebuild** it. **At the same time**, Yale university **said** that a commission would go to South Africa in July to **study** the system of apartheid.

Another example: achieving partial/slanted/biased text (*RG:Partiality*):

Setting the rhetorical goals:

set *RG:partiality* to *explicit* if:

- S and H affects for the topic agree and
- desired interpersonal distance is *close*
- desired hearer emotional state is *calm*
- relative social status is *equal* or *subordinate*
- atmosphere (tone) is *informal*
- desired H emotion toward S is *like*

set *RG:partiality* to *implicit* if:

- S and H affects for the topic agree and
- desired interpersonal distance is *distant*
- relative social status is *dominant*
- desire to involve hearer is *leave*

otherwise, set *RG:partiality* to *impartial* if:

- S and H affects agree, or if their affects disagree and H knowledge level is *expert* and S knowledge level is *student* or *novice*, and desired H emotion toward S is *respect* or *like* (S does not exhibit partiality and ignorance toward expert H)

set *RG:partiality* to *explicit* if:

- S and H affects disagree and
- desired H emotion toward S is *dislike* or
- desired H emotional state is *angry*

otherwise, set *RG:partiality* to *implicit* if:

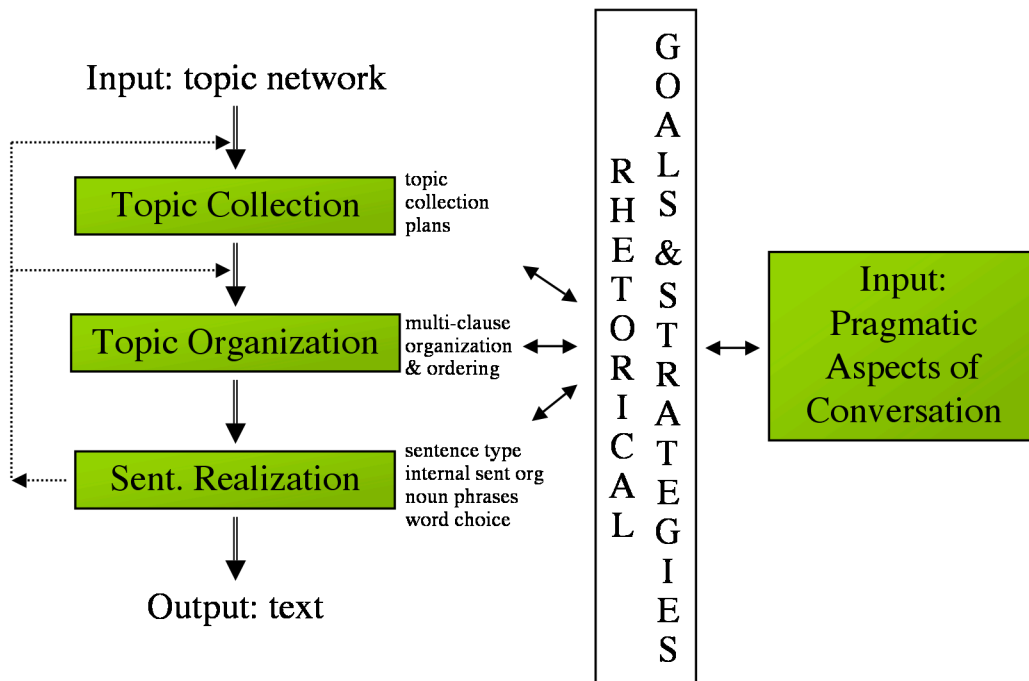
- S and H affects disagree and

- desire to involve H is *involve* or
- relative social status is *subordinate*

Controlling the generator:

- **Topic organization:** Interpret groups of topics appropriately
- **Topic organization:** Juxtapose topics to enhance or mitigate effect
- **Sentence inclusion:** Include slanting topics
- **Sentence inclusion:** State explicit opinions and judgments
- **Sentence organization:** Include slanting adjectives and adverbs
- **Word/phrase choice:** Select slanted verbs and nouns

Architecture of PAULINE:



Setup phase:

- User sets situational, Speaker, and Hearer characteristics, and gives PAULINE communicative goals

Generation action:

- High-level topic collection plan: derive sequence of topics
- Mid-level sentence content scoping and organization rules (= grammar)
- Low-level NP planning and word choice (= grammar, lexis)

Throughout:

- Where undetermined decisions remain, system appeals to Rhetorical Goals, providing alternatives
- Each alternative specifies which RG values it furthers
- RG controller combines their preferences for decision

3. What is Style?

So: what can we learn about style, in text and in general behavior?

In text: style results from the ‘small’ decisions once the ‘big’ ones have been made. By making the ‘small’ decisions all ‘point the same way’, their effects are cumulative. These effects can achieve additional communicative goals. By changing Rhetorical Goal values, one can change style of the text, and hence control goal achievement.

Groupings of Rhetorical Goals together give certain characteristic effects:

RG	Value	Style
• RG:Force	<i>high</i>	⇒ <i>no-nonsense</i>
• RG:Partiality	<i>high</i>	
• RG:Verbosity	<i>low</i>	
• RG:Force	<i>low</i>	⇒ <i>blather</i>
• RG:Partiality	<i>low</i>	
• RG:Verbosity	<i>low</i>	
• RG:Force	<i>high</i>	⇒ ??
• RG:Partiality	<i>low</i>	
• RG:Verbosity	<i>high</i>	
	<i>low</i>	

In general behavior: decisions’ effects can have underlying dependencies: groupings of decision strategies exist. Groupings determine the overall ‘style’ or ‘tenor’ of behavior. By changing ‘soft goal’ values, one can change the style of behavior.

Example: *The Hurried Traveler*:

- Goals: Drive across town to X; obey traffic laws; minimize time taken
- Top-down plan: route map
- Defer low-level planning until execution
- Use opportunities (even to extent of changing main plan)
- Compare importance of Preservation Goals at every decision (*break the law or wait?*)

RG	Value	Style
• Haste	<i>high</i>	⇒ <i>reckless</i>
• Legality	<i>low</i>	
• Care	<i>low</i>	
• Haste	<i>low</i>	⇒ <i>careful</i>
• Legality	<i>low</i>	
• Care	<i>high</i>	
• Haste	<i>high</i>	⇒ <i>hasty</i>
• Legality	<i>high</i>	
• Care	<i>high</i>	

- Haste *low*
- Care *low*

↓

*careless,
sloppy*

4. Prescriptive and Restrictive planning

One needs a different method of planning from the traditional hierarchical top-down planning of older AI systems. In order to achieve the principal goal(s), the agent has one (or a small number of primary goals—these give rise to the traditional plan, derived top-down. But ‘in the cracks’, during execution, a myriad of ‘small’ decisions appear. By deciding them under a coherent policy, certain effects can be achieved. These effects are:

- *Summative*, not stepwise enabling
- *Parallel to the main goal(s)*, mostly *independent* of them

Two kinds of planning/monitoring are therefore needed: traditional and planning-during-monitoring:

(Prescriptive) Planning:

- Process: gradual refinement: from larger-scale plan to each small part
- Effects: long-range, formative/structural
- Intent: usually one (or a few) primary goal(s)
- Operators: standard plans
- Goals: achieved and flushed

(Restrictive) Execution-time deciding:

- Process: discontinuous, independent decisions that arise opportunistically
- Effects: short-range, but cumulative
- Intent: usually multiple simultaneous goals
- Operators: ? — no standard plans; heuristics, rather
- Goals: persist for duration

In Restrictive Planning:

- Decision points seem to occur ‘randomly’
- Often impossible to further *all* active goals at any point
- Decisions’ effects can have underlying dependencies: groupings of decision strategies exist
- Aim for overall ‘style’ or ‘tenor’ of behavior
- Different groupings create different styles
- Restrictive planning starts where prescriptive planning stops
- Decisions’ effects have cumulative / opposing force
- Tally decision’s effects on all goals
- Paradigm: execution monitoring
- Some restrictive goals can be reformulated prescriptively

Example, choosing among alternatives:

- | | |
|---|---|
| <ul style="list-style-type: none">• “It pisses me off that”<ul style="list-style-type: none">– Formality: <i>low</i>– Force: <i>high</i>– Partiality: <i>explicit</i>• “It angers me that”<ul style="list-style-type: none">– Formality: <i>high</i>– Force: <i>high</i>– Partiality: <i>explicit</i>• “It is unfortunate that”<ul style="list-style-type: none">– Formality: <i>high</i>– Force: <i>low</i>– Partiality: <i>explicit</i> | <ul style="list-style-type: none">• But what if<ul style="list-style-type: none">– RG:Formality = <i>low</i>– RG:Force = <i>low</i>?• Need policy for resolving inconsistent rhetorical preferences:<ul style="list-style-type: none">– Fixed preference order– Prefer least-satisfied– Prefer least-recent– etc. |
|---|---|

Execution monitoring:

Monitoring Tasks:

- For each selection: determine which goals will be satisfied
- For each selection: determine which goals will be hindered
- Resolve conflicts by maintaining relative priorities
- Update satisfaction status of each goal

Conflict Resolution Strategies:

- Least-satisfied goals
- Least-recently satisfied goals
- Combination of 1 and 2
- Common goals (Durfee & Lesser 86)
- More easily achieved goals (ibid.)
- Discriminative intermediate goals (ibid.)

One can almost develop a new vocabulary:

‘Soft’ Goals:

- Some goals are ‘soft’
- Decision Effects:
- The effects of a choice can help or hinder a goal

Soft Goal Groupings:

- A group of *cogols* act in concert to create a style
- Soft Goal Comparisons:

Each goal has a satisfaction status

- One goal is more satisfied or less satisfied than another

Soft Goal Status:

- A soft goal is *oversatisfied* or *undersatisfied* with respect to its cogols
- A soft goal can be critically *oversatisfied* or *undersatisfied* and need repair

Optional Readings

PAULINE:

Hovy, E.H. 1987. *Generating Natural Language under Pragmatic Constraints*. See the book or the AI Journal article (1990).

Other related work on generator variability:

Jameson, A. 1987. How to Appear to be Conforming to the ‘Maxims’ Even If You Prefer to Violate Them. In G. Kempen (ed), Dordrecht, Boston: Kluwer Academic Publishers.

Clippinger, J.H. 1974. *A Discourse Speaking Program as a Preliminary Theory of Discourse Behavior and a Limited Theory of Psychoanalytic Discourse*. Ph.D. dissertation, University of Pennsylvania.

Paris, C.L. 1987. *Discourse Strategies for Descriptions of Complex Physical Objects*. Ph.D. dissertation, Columbia University.

Example 1. Newspaper Article

Partiality: unbiased

Haste: low

Formality: formal

Detail: some interpretation

Force: medium

Time: much

Tone of interaction: formal

Speaker's opinions of the topic: neutral

Depth of acquaintance: strangers

Goal to affect hearer's knowledge: teach

Goal to affect hearer's opinions: none

In early April, a shantytown -- named Winnie Mandela City -- was constructed on Beinecke Plaza by several students, so that Yale University would divest from companies doing business in South Africa. At 5:30 am on April 14, it was destroyed by officials; also, at that time, the police arrested 76 students. The students requested that Yale give them permission to reassemble the shantytown while several local politicians and faculty members expressed criticism of Yale's action. Finally, the university permitted the students to reconstruct it and, concurrently, Yale University announced that a commission would go to South Africa in July to examine the system of apartheid.

Example 2. Passerby Describing Shantytown Issue

Partiality: unbiased

Haste: medium

Formality: informal

Detail: some interpretation

Force: medium

Time: some

Tone of interaction: informal

Speaker's opinions of the topic: neutral

Depth of acquaintance: strangers

Goal to affect hearer's knowledge: neutral

Goal to affect hearer's opinions: none

Yale University punished a number of students for building a shantytown on Beinecke Plaza by arresting 76 students and tearing the shantytown down one morning in April. The students wanted Yale to divest from companies doing business in South Africa. Finally, the university gave in and allowed the students to rebuild the shantytown.

Example 3. Protester Literature

Partiality: biased

Haste: low

Formality: formal

Detail: much interpretation
Force: medium
Time: much
Tone of interaction: formal
Speaker's opinions of the topic: for protesters
Depth of acquaintance: strangers
Goal to affect hearer's knowledge: teach
Goal to affect hearer's opinions: switch

As a reminder to Yale University to divest from companies doing business in South Africa, a large number of concerned students erected a shantytown -- named Winnie Mandela City -- on Beinecke Plaza in early April. The local community expressed support for the students' action. The university told the students to erect the shantytown elsewhere. Later, at 5:30 am on April 14, the shantytown was destroyed by officials; also, at that time, the police arrested 76 students. The students requested that Yale University give them permission to reassemble it on Beinecke Plaza; also, at that time, several local politicians and faculty members expressed criticism of Yale's actions. Finally, Yale permitted them to reconstruct the shantytown and, concurrently, the university announced that a commission would go to South Africa to examine the system of apartheid in July.

Example 4. Official Yale Literature

Partiality: biased
Haste: low
Formality: formal
Detail: much interpretation
Force: medium
Time: much
Tone of interaction: formal
Speaker's opinions: for university
Depth of acquaintance: strangers
Goal to affect hearer's knowledge: teach
Goal to affect hearer's opinions: switch

In early April, a small number of students were involved in a confrontation with Yale University over Yale's investment in companies doing business in South Africa. The students constructed a shantytown --- named Winnie Mandela City --- on Beinecke Plaza in order to force the university to divest from those companies. Yale requested that the students erect it elsewhere, but they refused to leave. The university intended to be reasonable. The university gave it permission to exist until the meeting of the Yale corporation, but even after that the students still refused to move. At 5:30 am on April 14, officials had to disassemble the shantytown. Finally, Yale, being conciliatory toward the students, not only permitted them to reconstruct it, but also announced that a commission would go to South Africa in July to examine the system of apartheid.

Example 5. Protester's Description on Street

Partiality: biased, medium
Haste: medium

Formality: informal
Detail: some interpretation
Force: medium
Time: some
Tone of interaction: informal
Speaker's opinions of the topic: for protesters
Depth of acquaintance: acquaintances
Goal to affect hearer's opinions: switch

I am angry about Yale's actions. The university had officials destroy a shantytown called Winnie Mandela City on Beinecke Plaza at 5:30 am on April 14. A lot of concerned students built it in early April. Not only did Yale have officials destroy it, but the police arrested 76 students. After the local community's huge outcry, the university allowed the students to put the shantytown up there again.

Example 6. Angry Yale on Street

Partiality: biased, high
Haste: medium
Formality: informal
Detail: some interpretation
Force: high
Time: some
Tone of interaction: informal
Speaker's opinions: for university
Hearer's emotional state: angry
Depth of acquaintance: acquaintances
Goal to affect hearer's opinions: switch

It pisses me off that a few shiftless students were out to make trouble on Beinecke Plaza one day: they built a shantytown, Winnie Mandela City, because they wanted Yale University to pull their money out of companies with business in South Africa. I am happy that officials had to remove the shantytown one morning. Yale said that a commission would go to South Africa in July, because the university wanted to be reasonable. Finally, Yale gave in and let the shitheads put it up again, and Yale said that a commission would go to South Africa to check out the system of apartheid.