Habituals, Stativity and Detecting Habituality

Graham Katz

Department of Linguistics
Georgetown University

Paris Workshop: “Dispositions, Abilities and States”
June 24-25, 2010
Practical Problem: Determine event sequence from newspaper article:

A man walked into a bar in the District last night. The bar was mostly empty, he worked there and the few customers were drinking, so nobody noticed when he went into a back room. At closing time, four employees of the bar were found tied up. They were all male Hispanic immigrants who lived in the building.


- Temporal adverbials locate “Narrative Time”
- Event sentences position events and relocate “Narrative Time”
- State sentences position states and leave “Narrative Time” alone
(1) A man walked into a bar last night. The bar was mostly empty. He went into a back room.

To correctly interpret text need to determine the stativity of each clause
Detecting Statives

How do we determine if a clause is stative?

- **lexical statives** are marked in the lexicon
  - statives: believe, know, like, live, . . .
  - non-statives: eat, kiss, talk, sleep, . . .
- BUT: derived **progressives statives** and **perfect statives** are marked morphologically
  - -ing
  - have+ -en
- derived **habitual statives** are not marked in English
  - work is event verb (unlike live)
  - work has no special morphologically marking

  ...he worked there ...
Two Puzzles about Habituals

- How do we identify habituals as habituals?
- Why are habituals stative?
Aspectual classes (aktionsarten) (Vendler 1967; Dowty 1979): Classification of predicates on the basis of their temporal semantic properties.

- **Activity** Durative event without a distinguished endpoint  
  *run, push a cart, drink beer*

- **Accomplishment** Durative event with a distinguished endpoint  
  *run a mile, build a house, drunk a beer*

- **Achievement** Momentary events (with distinguished point)  
  *recognize your enemy, reach the summit*

- **State** Non-dynamic propositions (without distinguished point)  
  *know French, have a coat on, be on time*
Statives contrast with eventives in many ways (Lakoff 1966; Sag 1973; Dowty 1979; Hinrichs 1985)
Grammatical contrasts: simple present tense, progressive and wh-cleft

(2)  a. John appreciates the cake Mary brought him.
    b. *John is appreciating the cake Mary brought him.
    c. *What John did was appreciate the cake Mary brought him.

(3)  a. ??John eats the cake Mary brought him.
    b. John is eating the cake Mary brought him.
    c. What John did was eat the cake Mary brought him.

Interpretive contrasts: *when*-clauses, modals:

(4)  a. When Mary arrived in town, Steve owned a red Ferrari. * simultaneous
    b. When Mary arrived in town, Steve bought a red Ferrari. * sequential

(5)  a. Steve must own a red Ferrari. * epistemic
    b. Steve must buy a red Ferrari. * deontic

Interpretation in Narrative
Some verbs (e.g. *sleep*, *stay*) that are occasionally classified as “stative” (Maienborn 2005) pattern with non-statives:

(6)  
   a. ??He sleeps.  
   b. He was sleeping.  
   c. What he did was sleep.

(7)  
   a. He must sleep.  
   b. When the sun went down, he slept.
Habituals as Statives

- Appear in simple present tense

  (8)  
  a. Peter knows French.  
  b. Peter works in the garden.

- Induce epistemic reading of modal verb *must*

  (9)  
  a. Peter must know French (...he got the table so quickly)  
  b. Peter must work in the garden (...his tomatoes are so nice)  
      (...or he’ll go crazy)

Some other contrasts:
- “Simultaneous” interpretation when embedded under past tense verbs

  (10)  
  a. Peter claimed that Vivian knew French.  
  b. Peter claimed that Vivian worked in the garden.

- Fact reading of gerund

  (11)  
  a. Vivian’s knowing French annoyed Peter.  
  b. Vivian’s working in the garden annoyed Peter.
Aspectual classification not of verbs but of *predicates*. Character of NP arguments can “shift” aspectual class. Bare plural or mass noun objects turn accomplishments into activities:

(12) a. Ed repaired a chair in an hour/*for an hour.  
b. Ed repaired chairs for an hour/*in an hour.

(13) a. Ed ate a sandwich in an hour/*for an hour.  
b. Ed ate soup for an hour/*in an hour.

Operator Shifters

Progressives shift eventive to stative meaning (Taylor 1977; Vlach 1993)

(14) a. He must be eating. \textit{deontic}
b. When the sun went down he was eating. \textit{simultaneous}
c. John woke up. His wife was working. He got out of bed. \textit{no movement}

Adverbial operators shift among types of eventive meaning (Moens and Steedman 1988)

(15) a. She dialed this telephone number (in seven seconds).
b. She dialed this telephone number repeatedly for seven minutes.

Subject to semantic constraints of repeatability

(16) a. She ate her cookie in seven seconds.
b. ??She ate her cookie repeatedly for seven seconds.

This can also be covert (and iterated)

(17) It took me a year to play the minute waltz in under a minute for over an hour.
Meaning of Habitual

- Obvious idea: Habituality is covert aspectual shifter from eventive to stative meaning.
- Question: What is the meaning of this aspectual shifter?

Habitual (and Dispositional) sentences express “gnomic” or law-like propositions.

(18)  
- a. Sugar dissolves in water.
- b. Objects are attracted to one another with a force proportional to the product of their masses and inversely proportional to the distance between them.
- c. Bishops move diagonally.

They are “Generic” (or “Characterizing”) (Note: They need not be “eternal”)

(19)  
- a. John works for the Coca-Cola company.
- b. Apples cost 99 cents a kilo.
Carlson’s G/G’ Operators

Carlson (1977): stage-level vs. individual level predicates:

(20) a. John walked to school  
    \[ \exists x^s[R(x^s, john) \land \text{walk-to-school}(x^s)] \]
    b. John likes school.  
    \[ \text{like-school}(john) \]

G operator converses state-level to individual-level predicate:

(21) John walks to school  
    \[ G(\text{walk-to-school})(john) \]

And the G’ operator to convert individual-level predicates to kind predicates:

(22) a. Grad students like school  
    \[ G'(\lambda x [\text{like}(x, \text{school})])(\text{grad-students}) \]
    b. Grad students walk to school  
    \[ G'(G(\text{walk-to-school}))(\text{grad-students}) \]

Problems galore: information structure, binding, etc., etc.
Classic relational analysis (Carlson 1989; Schubert and Pelletier 1989; Diesing 1992) Generic sentences contain **GEN** operator, a covert, modalized quantificational adverb:

\[(23)\]  
\[a. \text{Cars have wheels (}= \text{Cars usually/generally have wheels)}\]
\[b. \text{GEN}_x [\text{car}(x)] \exists_y [\text{wheel}(y) \land \text{has}(x,y)]\]

**Initial Consequences**: Provides straightforward account of:
- Existential/Universal ambiguity of Bare Plurals
- Anaphoric “binding” by Bare Plurals

\[(24)\]  
\[a. \text{Cats like themselves.}\]
\[b. \text{GEN}_x [\text{cats}(x)] [\text{like } (x,x)]\]

Is the habitual operator just **GEN**?
Habitual Semantics

Habituals appear to report lawlike “patterns of activity” as generics report lawlike quantificational relations.

(25) Peter goes bowling on Tuesday nights.

Means: If it is Tuesday night (and nothing odd happens), Peter will go bowling—sure looks like GEN...

Capacity readings:

(26) a. This machine crushes oranges.
    b. Mary handles the mail from Antarctica.
    c. Peter drinks beer.

No (or not much) actual activity has to take place. Is this like

(27) Frenchman like horsemeat
Kratzer (1995) suggests:
- State predicates (at least individual level ones) lack event argument
- GEN binds event argument in habituals
- Habituals then lack event argument and are stative

(28)  
   a. When John eats fish, he throws up.  
   b. \textbf{GEN}_{e,e′} [\text{eat-fish}(e,john)] \exists e′ [C(e,e′) \land \text{throw-up}(e′,john)]

(29)  
   a. John drinks beer.  
   b. \textbf{GEN}_e [\text{in}(John,e) \land C(e)] [\text{drink-beer}(e,john)]
Doubts about HAB=GEN

GEN can operate on states. (cf. Contrast: progressive operator)

(30) a. Dogs like cats.
    b. Dogs chase cats.

(31) John is liking cats.

If HAB=GEN we need to be able to iterate the operation.

Individual event relation

(32) a. When John lectured today, he spoke quickly
    b. When John lectures, he speaks quickly.
    c. When John lectures, he neglects his garden. (but in the summer...)

Time-interval relation:

(33) When John eats fish, he loses weight.
Rimell (2004) notes contrast between modified and unmodified habituals:

(34)  a. Mary drinks a beer when she is at Dempsey’s Pub  
b. Mary drinks beer when she is at Dempsey’s Pub  

(35)  a. Mary drinks beer.  
b. *Mary drinks a beer  

Both should have the fine interpretation:

(36)  \( \text{GEN}_e [C(e)] \ \exists x [\text{beer}(x) \land \text{drink}(\text{mary}, x)] \)  

Contrast between “relational habitual” and “simple habitual”

(37)  a. *Writing an angry letter is a bad habit.  
b. Writing letters is a good habit.  
c. Writing an angry letter when someone insults you is a bad habit.
Dahl (1995) cross-linguistic questionnaire:

(38)  [Q: What your brother DO right now? (= What activity is he engaged in?)
      Answer by someone who can see him:] He WRITE letters.

(39)  [Q: What your brother usually DO after breakfast?
      A:] We WRITE letters

(40)  [A: My brother works at an office. B: What kind of work he DO?
      A:] We WRITE letters

Results from 76 languages:

- 24 Languages mark relational habituals
- Only 7 mark simple habituals with same marking
HAB as a frequency adverb

**Claim:** Habitual predicates are **stative** predicates derived from activities by a frequency-adverb-like operator HAB (Bennett and Partee 1978; Katz 1995; Dobrovie-Sorin 2003)

(41)  
  a. John drove a truck for an hour.  
  b. John is driving a truck.  
  c. John drove a truck for a living.  
      John drives a truck

(42)  
  a. John works in the garden.  
  b. ??John plants a garden  
  c. ??John recognizes a criminal.

HAB ≠ GEN
Frequency Adverbials

Frequency adverbials are different from quantificational adverbials (although both quantify).

(43)  
  a. Peter often smokes.  
  b. Peter smokes often.

(44)  
  a. When he goes to the movies, Peter frequently uses the restroom.  
  b. When he goes the the movies, Peter uses the restroom frequently.

In English:

- Frequency adverbial associated with sentence final position
- Quantificational adverbial associated with VP initial position

- **Frequency adverbs**: frequently, regularly, often, daily
- **Quantificational**: always, usually, never, seldom, rarely
Frequency/Quantificational Ambiguity

Significant lexical overlap (many adverbs *ambiguous* between frequency and quantificational use)

(45)  
  a.  John often writes letters.  
  b.  John writes letters often.

(46)  
  a.  When she goes to the beach, Stefanie often puts suncream on.  
  b.  When she goes to the beach, Stefanie puts suncream on often.

Frequency adverbials tend to get used as quantificational adverbials (but not the other way around)

(47)  
  a.  *John eats beans usually.  
  b.  John regularly eats beans.

- Frequency adverbs: specify distribution of events in a time interval (how many of them there are, how close together, how evenly distributed, etc.) 
  \( F-Adv(\phi, t) \)
- Quantificational adverbs: specify the quantificational relationship among two event predicates: 
  \( Q-adv(\phi, \psi) \)
Semantics of frequency adverbs

Frequency adverbs can be interpreted as generalized quantifiers over time

\[
(48) \quad [\text{daily}] = \lambda P \ \forall \ \text{day}(t) \rightarrow \exists e \ [P(e) \land \forall e' [P(e') \land \tau(e') \subseteq t] \rightarrow e' = e]
\]

Typically frequency adverbs are quite vague:

\[
(49) \quad [\text{frequently}] = \lambda P \ \exists d \ \forall e \ [P(e) \rightarrow \exists e' [P(e') \land \text{distance}(e,e') < d]]
\]

We can be pedantic:

\[
(50) \quad [\text{regularly}] = \lambda P \ \exists d \ \forall e \ [P(e) \rightarrow \exists e' [P(e') \land \text{distance}(e,e') = d]]
\]
Quantificational vs. Frequency

Frequency adverb is quantificational over times; Q-adverb relates events:

(51)  
   a. In 1993, Marc ate beans at *The Rib Palace* regularly.
   b. In 1993, Marc usually ate BEANS at *The Rib Palace*.

(52)  
   a. \[\text{regularly}(\lambda e [\text{eat}(e,\text{Marc,beans}) \land \text{at}(e,\text{The Rib Palace}) \land e \subseteq 1993])\]
   b. \[\text{usually}_e[[\text{eat}(e,\text{Marc,beans})] \land \tau(e) \subseteq 1993, \text{at}(e,\text{The Rib Palace})]]\]

Quantificational adverbs always “scope” over frequency adverbs:

(53)  
   a. Peter sometimes exercises regularly.
   b. sometimes(C(e),regularly(\lambda e [\text{exercise}(e,\text{Peter})]))

(54)  
   a. When he is on vacation, Peter sometimes exercises regularly.
   b. sometimes(on(t,peter,vacation),regularly(\lambda e [\text{exercise}(e,\text{Peter}) \land e \subseteq t]))
Hypothesis: GEN is a quantificational adverb and HAB is a frequency adverb (Bennett and Partee 1978; Farkas and Sugioka 1983; Rimell 2004; Boneh and Doron 2008)
Carlson and Spejewski (1997) discuss examples in which there appears to be wide scope of a generic operator of some sort:

(55) My grandmother used to bake the most wonderful pies. She would go to the orchard on Shady Lane to pick the apples. She would spend all morning preparing the pies, putting them in the oven around noon. When they were done, she would take them out and let them cool.

Here we have GENERICS not HABITUALS (these are not stative clauses)
How do we determine if the HAB operator is present?
Identifying Habituals

In some languages habituals are marked:
Czech vá (Filip 1994)

(56) a. V sobotu Honza sedává v hospodě
   “On Saturday John usually sits in the pub”

(57) a. V sobotu Honza sedí v hospodě
   “On Saturday John sits/is sitting in the pub”

In English we have to guess (although we have some markers, such as used to or habitually or these days)

(58) a. John worked in the yard
   b. John used to work in the yard
   c. John works in the yard.

Sometimes we get stuck without a cue:

(59) a. If I were to go to Germany, I would visit you
   (cf. If I were to eat meat, I would order steak.)
**Wild speculation:** Habitual Marking is only obligatory when the grammatical system of the language doesn’t provide enough cues for a speaker to guess.

- Obligatory determiners provide clear markers of preferred accomplishment interpretation:
  \[ \text{John drank the beer} \Rightarrow \text{likely non-habitual} \]

- Obligatory progressive provide clear marking of preferred ongoing event interpretation:
  \[ \text{John is drinking beer} \Rightarrow \text{likely non-habitual} \]

(Language with no determiners, no plural, and no progressive might need overt morphological marking (Bybee, Perkins, and Pagliuca 1994))

How do we quantify “enough clues”? Perhaps via computational corpus analysis.
Joint work with Thomas Mathew (Mathew and Katz 2009)

- Task: Distinguish **habitual** use of verb from **episodic**

- Method:
  - Annotate occurrences of lexically non-stative verbs as to their habituality
  - Identify features which might determine whether or not the use is habitual
  - Use these features as input to Machine learning algorithm

- Hope: demonstrate the difficulty/ease of classifying on the basis of overt categories
Supervised Learning Methodology

- Choose verbs to annotate which are not lexically stative.

  (60)  
    a. John **likes** oranges.  
    b. John **ate** oranges.

- Annotate verb in context as to whether it's use is habitual or episodic

  (61)  
    a. John rarely ate fruit. He just ate oranges.  
    b. John didn’t eat much at breakfast. He just ate oranges.

- Identify **features** which might be relevant to classification

  (62)  
    a. John ate an orange **yesterday**.  
    b. John eats oranges **every day**.

- Use Machine Learning techniques to classify
  - Decision Tree
  - Naive Baysian
Corpus Annotation

Heuristics for Annotator:

- Identify if clause describes single (or a group events). Single event descriptors are episodic.
- Determine whether adding the adverb *usually* changes meaning significantly. If not, clause is classified as habitual.

Annotation:

- 1,816 clauses from Penn Treebank
  - Wall Street Journal (newspaper text)
  - Brown Corpus of Contemporary English (fiction, journalism, wide range)
- 72 distinct verbs
  - Chosen randomly
  - NOT lexical statives

Results:

- Relatively simple task:
  - Double annotation of 100 clauses $\Rightarrow$ 98% agreement
- Distribution: 80% episodic and 20% habitual.
- Highly skewed by verb
Many verbs appear mostly as episodics (57 of 74)

<table>
<thead>
<tr>
<th>Verb</th>
<th>Tokens</th>
<th>Habitual (%)</th>
<th>Episodic (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>report</td>
<td>115</td>
<td>0.87</td>
<td>99.13</td>
</tr>
<tr>
<td>cite</td>
<td>54</td>
<td>1.85</td>
<td>98.15</td>
</tr>
<tr>
<td>add</td>
<td>53</td>
<td>3.77</td>
<td>96.23</td>
</tr>
<tr>
<td>drop</td>
<td>25</td>
<td>4.00</td>
<td>96.00</td>
</tr>
<tr>
<td>tell</td>
<td>24</td>
<td>4.17</td>
<td>95.83</td>
</tr>
<tr>
<td>stop</td>
<td>18</td>
<td>5.56</td>
<td>94.44</td>
</tr>
<tr>
<td>pick</td>
<td>34</td>
<td>5.88</td>
<td>94.12</td>
</tr>
<tr>
<td>say</td>
<td>26</td>
<td>7.69</td>
<td>92.31</td>
</tr>
<tr>
<td>set</td>
<td>24</td>
<td>8.33</td>
<td>91.67</td>
</tr>
<tr>
<td>ask</td>
<td>28</td>
<td>10.71</td>
<td>89.29</td>
</tr>
<tr>
<td>give</td>
<td>45</td>
<td>11.11</td>
<td>88.89</td>
</tr>
<tr>
<td>come</td>
<td>207</td>
<td>11.59</td>
<td>88.41</td>
</tr>
<tr>
<td>hand</td>
<td>17</td>
<td>11.76</td>
<td>88.24</td>
</tr>
<tr>
<td>move</td>
<td>68</td>
<td>11.76</td>
<td>88.24</td>
</tr>
<tr>
<td>laugh</td>
<td>8</td>
<td>12.50</td>
<td>87.50</td>
</tr>
</tbody>
</table>
Habitual-skewed Verbs

- Few verbs appear mostly as habituals—only these 12
- (By design we included no verbs that were lexically stative)

<table>
<thead>
<tr>
<th>Verb</th>
<th>Tokens</th>
<th>Habitual (%)</th>
<th>Episodic (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>keep</td>
<td>31</td>
<td>51.61</td>
<td>48.39</td>
</tr>
<tr>
<td>remain</td>
<td>22</td>
<td>54.55</td>
<td>45.45</td>
</tr>
<tr>
<td>refer</td>
<td>9</td>
<td>55.56</td>
<td>44.44</td>
</tr>
<tr>
<td>apply</td>
<td>8</td>
<td>62.50</td>
<td>37.50</td>
</tr>
<tr>
<td>alert</td>
<td>3</td>
<td>66.67</td>
<td>33.33</td>
</tr>
<tr>
<td>be</td>
<td>3</td>
<td>66.67</td>
<td>33.33</td>
</tr>
<tr>
<td>create</td>
<td>3</td>
<td>66.67</td>
<td>33.33</td>
</tr>
<tr>
<td>deny</td>
<td>3</td>
<td>66.67</td>
<td>33.33</td>
</tr>
<tr>
<td>persist</td>
<td>4</td>
<td>75.00</td>
<td>25.00</td>
</tr>
<tr>
<td>maintain</td>
<td>1</td>
<td>83.33</td>
<td>16.67</td>
</tr>
<tr>
<td>act</td>
<td>7</td>
<td>85.71</td>
<td>14.29</td>
</tr>
<tr>
<td>require</td>
<td>13</td>
<td>92.31</td>
<td>7.69</td>
</tr>
</tbody>
</table>
Most-skewed verbs were left out.

- Top 25% (17) verb stems skewed towards the episodic category and the top 25% of the verb stems skewed towards the habitual category.
- Classification sample: 1,052 clauses (57 distinct verb stems)
  Of them: 73.1% episodic and 26.9% habitual
  Majority class baseline: 73.1%
Features for Predicting Habituality/Episodicity

**Tense**
- *Present*: She sings
- *Past*: She sang
- *Infinitive*: We expect her to sing

**Aspect**
- *Progressive*: She is singing
- *Perfect Aspect*: She has sung

**Temporal Adverbial**
- *Quantificational Temporal Adverbial*: She sang every night
- *Specific Temporal Adverbial*: She sang yesterday

**Subject NP**
- *Bare-plural Subject*: Slaves sang
- *Definite Subject*: Sonia sang

**Object NP**
- *Absent Object*: She ate
- *Bare-plural Object*: She sang spirituals
- *Definite Object*: She sang “Strange Fruit”

**Prepositional Phrase**
- *at-PP*: She sang at home
- *in-PP*: She sang in prison
- *on-PP*: She sang on Monday
% to Feature measures how frequently the feature indicates the category
% to Category measures how frequently a feature is used in the category

Habituals
- Present tense habitual 84% of time, but only 50% of habituals in present
- Presence of a quantifying temporal adv indicates habitual 91%, but only 30% of habituals have one
- 80% of habitual sentences have indefinite object, but indefinite object indicates habitual only 34% of the time.

Contrast with Episodics:
- Past tense and presence of a definite subject provide a good indication on episodicity and are also frequently used in episodics.
- Presence of specific temporal adverbials is a rare but good indicator of episodicity
We used two standard machine-learning algorithms (Naive Bayesian and Decision Tree) to classify sentences (10-fold cross validation; 1,052 items)

<table>
<thead>
<tr>
<th></th>
<th>Habitual Precision</th>
<th>Habitual Recall</th>
<th>Episodic Precision</th>
<th>Habitual Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision Tree</td>
<td>84.3%</td>
<td>60.6%</td>
<td>86.8%</td>
<td>95.8%</td>
</tr>
<tr>
<td>Naive Bayes</td>
<td>81.7%</td>
<td>62.7%</td>
<td>87.3%</td>
<td>94.8%</td>
</tr>
<tr>
<td>Baseline</td>
<td>0%</td>
<td>0%</td>
<td>73%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Measures of Classification Success:

- **Precision**: Hearer perspective—Ratio of clauses classified as habitual (episodics) that were intended (by speaker) as habitu als (episodics)
- **Recall**: Speaker perspective—Ratio of clauses intended as habitual (episodic) those correctly classified as habitu als (episodics) by hearer.
Introduction
Statives and Habituals
Meaning of Habitual
When is a Clause Habitual?
Conclusion
References

Wild Functionalist Speculation
Corpus-based Identification of Habituals

Decision Tree

quant_temporal = T: HABITUAL (58.0/5.0)
quant_temporal = F
| tense = PA
| | bare_pl_subject = T
| | | def_object = T: EPISODIC (5.0/1.0)
| | | def_object = F
| | | | absent_object = T: EPISODIC (3.0/1.0)
| | | | absent_object = F: HABITUAL (6.0/1.0)
| | bare_pl_subject = F: EPISODIC (784.0/94.0)
| tense = PR
| | perfect = T
| | | def_object = T: EPISODIC (4.0)
| | | def_object = F
| | | | absent_object = T: HABITUAL (7.0/2.0)
| | | | absent_object = F
| | | | | def_subject = T: EPISODIC (8.0/3.0)
| | | | | def_subject = F: HABITUAL (2.0)
| | | | perfect = F: HABITUAL (126.0/18.0)
| tense = IN
Summary of Study

- On basis of simple superficial cues, classification is relatively simple
- Information not being used:
  - Lexical knowledge
  - Discourse cues

(63) 
  a. She didn’t like fruit. She only ate oranges.
  b. She didn’t have much to eat. She only ate oranges.

- Perhaps there is no need for marking in English for this reason
Conclusion

Results:
- Habitual sentences are aspectually statives
- Habituals can be divided into relational habituals (generics) and verbal habituals
- True habituals are formed only from activities
- Habituals are readily detected in English from surface cues

Future:
- Would it be more difficult to detect habituality in languages with overt habitual marking than in English?
- Is there a correlation between use of habitual marking in general and difficulty in determing habituality?
Toward the logic of tense and aspect in English.

Habituality and the habitual aspect.

University of Chicago Press.

On the semantic composition of English generic sentences.

Generic passages.
*Natural Language Semantics*. Addison-Wesley.