Logical Language Lojban

A Hackers' Spoken Language

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What Is Lojban?

- constructed *spoken* (human-human) language
- based on predicate logic
- relatively young (1950's – 1990's)

Outline

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What Is Lojban?

- conlang
- predicate logic
  - *person* is-going *to-dest from-source*
- developed since 1955
- current state finalized in 1997
  - grammar and base vocabulary frozen

Features

- unambiguous grammar
- phonetic spelling
- structurally simple
  - easy to learn
- 1350 root words
  - combinable to millions
- regular – no exceptions

Why Was Lojban Created?

- research into Sapir-Whorf hypothesis
  - “The structure of one’s language constrains one’s thinking.”
  - Null hypothesis: It doesn’t.
  - Will native Lojbanists exhibit “new” thought patterns?

My Aims With This Talk

- show that. . .
  - Lojban is of more than scientific interest
  - shows typical “hacker values”
- give a fun talk
- motivate actual use of Lojban
  - not a mobilization speech though

Design Goals wrt. Sapir-Whorf

- same expressive power of natural languages
- *but* significantly different structure
- remove restrictions on creative and clear thought/communication

Why Else Is Lojban Interesting?

- human-computer interaction
- more precise/powerful expression
  - full set of logical connectives
  - mathematical expressions properly expressible
- robust over noisy channels
- candidate for an international language

The Lojban Alphabet

’ , . a b c d e f g i j k l m n o p r s t u v x y z

- basic latin alphabet
- ‘h’, ‘q’, and ‘w’ are not Lojban letters
- punctuation characters “ ’ , . ” represent sounds
- no question/exclamation mark, etc.

Pronounciation of the Vowels

a	[a]	f**a**ther
e	[ɛ]	b**e**t, l**e**ns
i	[i]	gr**ee**n
o	[o]	j**o**ke, n**o**te
u	[u]	b**oo**t
y	[ə]	**a**bove

- vowel length doesn't matter

Pronounciation of the Consonants (excerpt)

c	[ʃ]	**sh**irt
j	[ʒ]	mea**s**ure
s	[s]	**s**oldier
v	[v]	**v**oice
x	[x]	lo**ch**, A**ch**
z	[z]	maga**z**ine

- variations permitted, as long as sounds are distinguishable
- In particular, ‘r’ can be any rhotic sound.

Pronounciation of Punctuation

’	[h]	a**h**ead
.	[ʔ]	pause/stop
,		non-standard syllable break

- examples later. . .

Basic Sentence Structure

person comes-to *to-dest from-source*

- predicate (“bridi”)
- arguments (“sumti”)
- syntax: x_1 R x_2 x_3 ...
  - asserts that $x_1 \ldots x_n$ are in relation R
  - often matches subject-verb-object form of natlangs

The Cast

- Starring Pesco and Maya.
- Names will be “lojbanized”.
  - transcribe phonetically
  - must end in a consonant
  - terminate with a pause (‘.’)
- original name spelling could be used
  - but requires an “escape”

The Cast – Lojbanized

	Lojban name	sumti form
Maya	ma,iar.	la ma,iar.
Pesco	peskos.	la peskos.

- la = flag word: “name follows”

An Example Relation

klama – to come/go to

- max. 5 (direct) arguments
- argument order is significant
- place structure defines argument meanings

klama – x_1 comes to x_2 from x_3 via x_4 using x_5

Our First Sentence

- R = klama
  x_1 = la peskos.
  x_2 = la ma,iar.

la peskos. [cu] klama la ma,iar.

- cu = flag word: “bridi follows”
  - usually elidable
- obvious/unimportant trailing arguments elidable

Pro-Sumti

- analogous to pronouns
- use in any sumti place

mi	me
do	you
ti	this here
ta	that there

Articles

le *bridi* [ku]

- le turns bridi relationships into sumti
- very close in meaning to “the”
- terminator ku usually elidable

Article Example

gunka – x_1 works on x_2 [activity] with goal x_3

- “le *bridi*” means some thing(s) that would fit the x_1 place of *bridi*.
- le gunka – “the worker(s)”
- Note: neither singular nor plural implied!

Tenses

- temporal
- spatial
- realized by attaching modifier words to the bridi

Temporal Modifiers

pu in the past

ca in the present

ba in the future

la peskos. ba klama la ma,iar.

- Pesco will go to Maya at some time in the future.
- relative to the time of speaking

Questions

- “Is it true that . . . ?”
- fill-in-the-blank(s)
  - “What is in relation . . . ?”
  - “In which relation(s) are . . . ?”

Truth-Value Questions

- prefix entire statement with xu

  xu la ma,iar. klama la peskos.

- “Does Maya come to Pesco?”

Fill-In-The-Blank for Relations

- put mo in the bridi place

  la lojban. mo

- “What is Lojban?”
- (“In which relationships . . . ?”)

Fill-In-The-Blank for Arguments

- put ma in one or more sumti places

  ma klama ma

- “Who goes where?”

Thoughts About Lojban Applied to Computers

- using lojban for human-computer interaction
- need to assume some level of proficiency in Lojban
- no deep investigation, just ideas for research

Talk To Your Computer In Lojban!

- authorative unambiguous grammar specified in YACC
  - EBNF version available
- therefore, easy and complete parsing
- recognize questions and imperatives
- maybe implement natural language interface with pattern matching?
- specialized subsets of Lojban maybe

Lojban As I18n Base Language?

- Lojban is easy to produce.
- I18n translates messages from some *base language*.
- problems with incorporating dynamic data
- structure of neither base nor target lang. understood
- Lojban beneficial if used as the base language?
  - Autoranslation to (pseudo-) English is already available.

Lojban For Programming

- use Lojban for naming identifiers
- no spaces needed between words
- questions/imperatives again
- relations?
- functions?

How To Learn Lojban

- basic grammar: only a few days
- you need vocabulary
  - practice!
  - flash-card programs available
  - `#lojban` (Freenode)
  - build a personal word list

Summary

- Lojban is general, clean, simple, and precise
  $\Longrightarrow$ powerful!
- Lojban can help us make clearer HCI's
  (Return of the Command Line!)

- Outlook
  - We need Lojban speakers.
  - How can we employ Lojban in programming/machine interfaces?

Further Reading

- The Paper: `khjk.org/sm-2005-lojban.pdf`
  - answering ;)
  - narrowing meaning and compound words
  - logic
- See `www.lojban.org`
  - “Level-0 Book”
  - Beginner’s Lessons
  - “Reference Grammar”