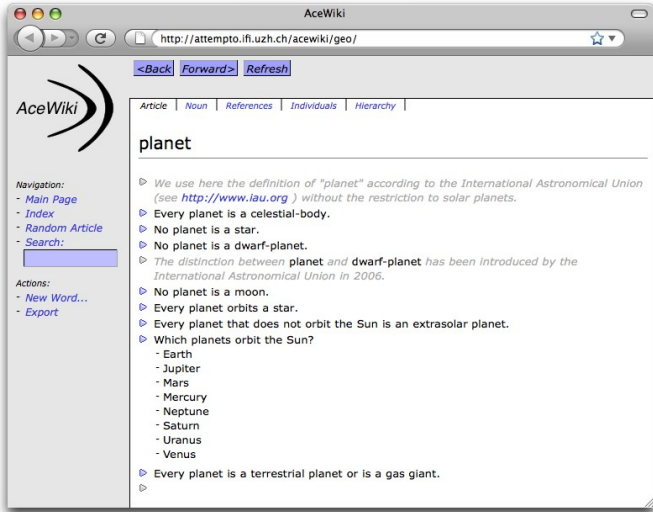# Natural

AceWiki is a semantic wiki using the controlled natural language ACE (Attempto Controlled English).

ACE supports a wide range of natural language constructs:

- Proper names, Nouns, Verbs, Adjectives
- Of-constructs: part of, child of, owner of
- Number restrictions: at most 3 countries
- Relative phrases: ... that orbits the Sun
- Anaphoric references: the country, the planet
- Existential and universal quantifiers: a, every
- Negation: no, does not, is not, it is false that
- Pronouns: something, everybody, what
- Conditional sentences: if ... then ...

... and much more.

Expressive

ACE is a formal language that is translatable into logic and other languages, for example OWL. AceWiki is designed to seamlessly integrate a reasoner (currently Pellet). The reasoner is used to ensure that the ontology is always consistent:

▷ Every country is a part of exactly 1 continent.
▷ Every country that borders Switzerland is a part of Europe.
▷ Germany borders Switzerland.
▷ Germany is a part of Asia.

Because ACE is more expressive than OWL, one can express complex statements that are beyond OWL (currently not used for reasoning):

▷ No ocean borders every continent.
▷ Every person that has a car owns the car or leases the car.
▷ If Berlin is a capital then Germany is a stable country.
▷ Every trip that starts at X and that ends at X is a round trip.

Questions in ACE can be used to express queries that are answered by the reasoner:

▷ Which cities are located in a country that borders Switzerland?
  - Berlin
  - Milano
  - Paris
  - Rome

The reasoner is used to infer class memberships and class hierarchies:

Upward
▷ Every country is an area.
▷ Every country is an object.

Downward
▷ Every baltic state is a country.
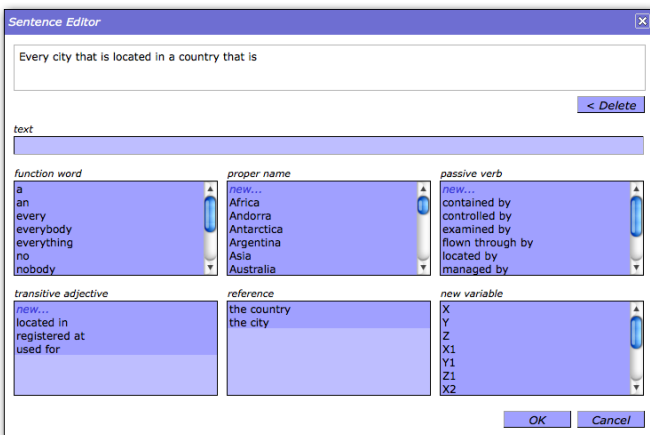▷ Every city-state is a country.
▷ Every landlocked-country is a country.

AceWiki

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Usable

AceWiki makes it easy to add and modify ACE sentences. A predictive editor helps the users to create sentences that comply with the ACE syntax:


Two usability experiments showed that AceWiki is easy to learn and use. Untrained subjects were told to collaboratively create a knowledge base using AceWiki:

- 78%–81% of the sentences were correct and sensible
- 61%–70% of them were complex (containing negations, implications, disjunctions, or number restrictions)
- Creation of a correct sentence every 5–6 minutes
- Definition of a new word every 5–7 minutes

Understandable

We performed an understandability experiment that compares the understandability of ACE to a comparable common formal language: MLL, a language that is heavily inspired by the Manchester OWL Syntax.
During the experiment, the subjects had to classify 10 statements in ACE/MLL as true or false according to a situation depicted by a diagram. Our results show that ACE was understood significantly better:

correct classifications out of 10
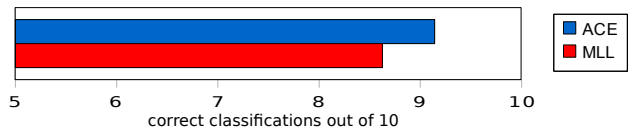
Furthermore, ACE required significantly less time to be learned:

time spent in minutes (time limit of 22 minutes)
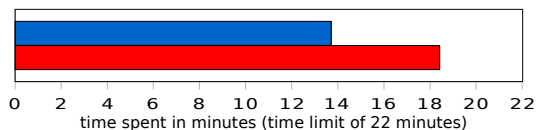
After the experiment, the subjects stated that ACE was more understandable:

subjective understandability (0 "very hard" ... 3 "very easy")