Thinknowlogy in a nutshell

Parsing:

- Thinknowlogy is a kind of Controlled Natural Language reasoner. It means that the grammar of the input as well as the output sentences is very limited. It only accepts sentences of which the meaning can be processed — whereas solutions accepting full sentences are unable to process the full meaning. The definitions of this very limited grammar are found in sub folder: data\grammar\. They are described in a kind of Extended Backus-Naur Form (EBNF);

- The use of lexical categories is crucial in advanced automated reasoning. So, after a sentence is entered by the user, the unknown words are created first. An algorithm determines its lexical category, or lexical categories, like adjectives, conjunctions, singular nouns, plural nouns and proper nouns. This algorithm works basically for any language, without the use of extensive words lists. In fact, only a few basic words are defined in the grammar file;

- After creating the unknown words, the sentence is mapped onto a fitting definition in the grammar file of the corresponding language, and the corresponding lexical category of each word;

- After parsing, the sentence is stored in a complex — language-independent — knowledge structure without losing meaning. It means that a readable sentence can be (re)constructed solely from the information stored in the knowledge structure. In fact, after storing the input sentence, the same sentence is reconstructed solely from the information stored in the knowledge structure, to make sure that no information is lost.

Reasoning:

- The reasoning system then performs all kinds of logical operations on the knowledge structure, such as drawing conclusions, making assumptions, and asking choice-questions. These logical operations — which I call *natural reasoning constructs* — are similar to the ones described by Aristotle, almost 2400 years ago, such as:

  Given:
  - "All philosophers are mortal."
  - "Socrates is a philosopher."

  Logical conclusion:
  - "Socrates is mortal."

  The simplest of these natural reasoning constructs are described in my Scientific Challenge document. I defy anyone to implement their own system with similar results;

- During the reasoning process, the system checks whether the input sentence conflicts with the existing knowledge. If so, the user is notified. The system also checks — and notifies the user — when existing knowledge is confirmed or updated by the input sentence, and when open questions are answered or updated;

- During the reasoning process, a justification structure is constructed for every self-generated conclusion, assumption and choice-question. It justifies the logical operations performed on the knowledge structure. This justification structure is kept up-to-date with each change. It includes a self-adjusting level of uncertainty for the self-generated assumptions: If the level of uncertainty of a self-generated assumption changes, the user will be notified.

Writing:

- Once the reasoning process is complete, the changes of the knowledge structure are presented to the user, written as readable sentences;

- The writing process is mapping the changes of the knowledge structure for each sentence onto the definitions in the grammar file. After the fitting definition is found, the output sentence is constructed — word-by-word — according to the found grammar definition;

- Since no meaning is lost during the storage and reasoning process, the output sentences have the same quality as the input sentences.

Fundamental science:
So, Thinknowlogy completes the circle: converting readable sentences to natural logic — and converting the results of the reasoning process back to readable sentences, without losing meaning and without human intervention.

This defines a fundamental science: A natural phenomenon is scientifically understood, if this natural phenomenon can have multiple appearances, like *electromagnetism*.

Electromagnetism is scientifically grounded, because we are able:

- to convert light into electricity, and electricity back to light,
- and to convert motion — via magnetism — into electricity, and electricity — via magnetism — back to motion.

Apparently, the field of AI / NLP is not scientifically grounded, mostly failing to complete the last step: converting logic to language. Hence, this Thinknowlogy project, which is open source software.