Understanding Texts in Attempto Controlled English

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Claim on the Attempto Web-Site

"... once written, texts in Attempto Controlled English (ACE) can be read and understood by anybody ..."

• true statement or exaggeration?

• problems understanding technical texts in full natural language
  • software specifications
  • instruction manuals

• can ACE as controlled language with a logical basis solve the understanding problem?

• my conclusion:
  • only to a certain extent
  • requires cooperation of authors and readers
Human Conversations

• interactive verbal communication between two or more people
• underlie explicit and implicit social rules, linguistic rules, timing constraints
• speakers and listeners usually take turns
• series of utterances, signs of assent/dissent, clarifying questions
• mutually expected and required cooperation between speakers and listeners to achieve a successful communication
My Claim

• understanding an ACE text
  • does not concern solely the reader
  • requires a cooperation between author and reader

• author-reader relation
  • can be considered a restricted form of conversation
  • underlies similar rules and constraints

• cooperation needs contributions from both author and reader
Contributions of the Author: Form

- since antiquity many guidelines of good writing style
- ACE Trouble Shooting Guide
  - general hints on constructing and interpreting ACE texts
  - pitfalls and how to avoid them
  - solutions for often occurring problems
- ACE parser generates a paraphrase of the ACE input
  - can clarify difficulties
  - can eliminate discrepancies between the meaning of an ACE text enforced by the ACE interpretation rules and meanings suggested by common sense
- hints, guidelines and writing rules contribute to the understanding of an ACE text, but do not address the essential and most critical point, namely the content of the text
Contributions of the Author: Content

• claim: effective communication requires cooperation between author and reader

• Grice introduced the cooperative principle in verbal conversations

• principle can also be applied to the author-reader case

• cooperative principle binds foremost the author as the producer of the ACE text, but also the reader who relies on the author to adhere to the principle

• Grice derived four maxims that substantiate the cooperative principle
  • Maxim of Quality: The text should be true.
  • Maxim of Quantity: The text should be complete without superfluous information.
  • Maxim of Relevance: The text should be relevant with respect to the topic described.
  • Maxim of Manner: The text should be perspicuous.

• one further author contribution addressed later
Contributions of the Reader

• assumptions: reader cannot contact author, has only author's ACE text

• important concept in verbal conversations: repair

• repair occurs when speakers correct themselves, but usually when listeners ask questions, give signs of assent/dissent

• reader cannot ask the author, but can quasi "ask" the ACE text
  • can submit it to the ACE parser to generate a paraphrase
  • can derive logical inferences from it

• RACE: first-order reasoner for ACE with equality
  • consistency checking
  • deduce one ACE text from another one
  • answer ACE questions on the basis of an ACE text
Contributions of the Reader: Repair

- RACE offers 11 forms of questions
  - asking for state of affairs: yes/no questions
  - asking for subjects or objects: who, whose, what, which
  - asking for adverbs or prepositional phrases: how, where, when
  - asking for aggregation (cardinalities, amounts): how many, how much
  - asking for verbs: what does ... do

- RACE generates some presuppositions & implicatures as logical deductions
  - existence: noun => there is, noun => there are
  - indefinite existence: noun => there is somebody, noun => there is something
  - possessives imply ownership: X of Y => Y has X, Y's X => Y has X
  - generalised determiners: some X => one X / at least one X / more than one X / ...
Question "why?"

- RACE can ask for all details of the ACE text, but...
- ... RACE cannot answer the important question "why?" that would reveal the intentions and the decisions of the author
- information on the ACE text itself, meta-information
- there are no ACE language constructs for meta-information
- possible way to provide meta-information: ACE comments
- comments must be formulated by the author as the source of the meta-information
- comments can contain any information using a richer language than ACE
Summary

- understanding an ACE text as intended by its author is a difficult problem
- problem does not concern the reader alone
- problem can be partially eliminated by a cooperation between the author and the reader
- cooperation requires contributions from both the author and the reader
The common sense reading of an ACE text and its reading according to the ACE interpretation rules can differ, as the following – admittedly contrived – text shows.

ACE input:
A manager calls a subordinate. He gives him an order.

Common sense reading:
A manager calls a subordinate. He gives him an order.

Paraphrase generated by the ACE parser APE shows interpretation rules:
There is a subordinate X1.
There is a manager X2.
The manager X2 calls the subordinate X1.
The subordinate X1 gives an order to the manager X2.

ACE reading:
A manager calls a subordinate. He gives him an order.