5. Metalanguage and Metadata

Metalanguage is language about language, natural or artificial.

- **To define semantics, Tarski (1933) used logic as a metalanguage for defining the truth value of any statement in logic.**

- **Annotations in any notation may state metadata about documents.**

- **And metadata about the metadata may also be useful.**

The IKL extension to Common Logic supports metalanguage. *
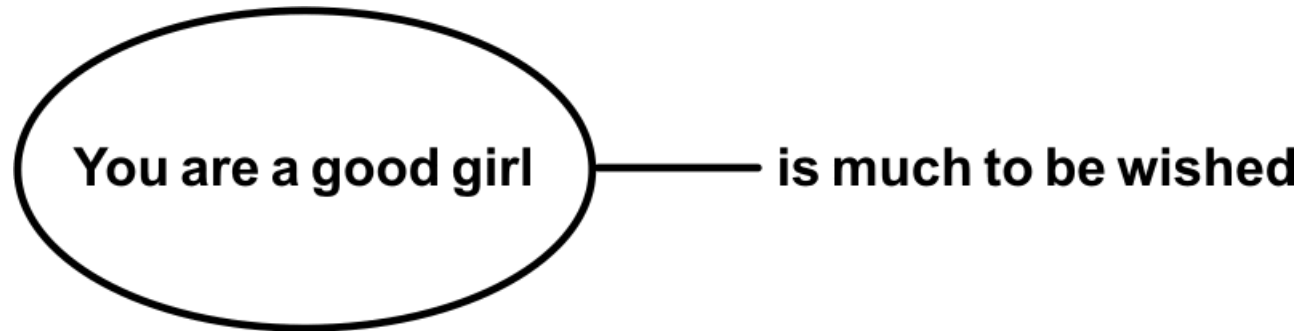
- **IKL enables CLIP to comment on anything expressed in CLIP.**

- **It can represent metadata about the sources and reliability of data.**

- **It can support reasoning about metaphor, modality, and issues of vague, fuzzy, missing, erroneous, or fraudulent information.**

Any Unicode strings may be used for CLIP names. Metadata may even be expressed by emojis.

* For the IKL documents, see http://jfsowa.com/ikl/ .

Metalanguage in Existential Graphs

A metalevel EG by Peirce (1898):

Peirce's English: *"That you are a good girl is much to be wished."*

A shaded oval negates the nested EG. Without shading, the EG expresses a proposition that is neither asserted nor negated.

The same proposition in CLIP: ["You are a good girl"].

History: *From 1898 to 1914, Peirce wrote extensively about metalanguage, modality, and intentionality. Those writings had a strong influence on logicians, philosophers, linguists, and AI researchers. For references, see* **http://jfsowa.com/pubs/5qelogic.pdf**
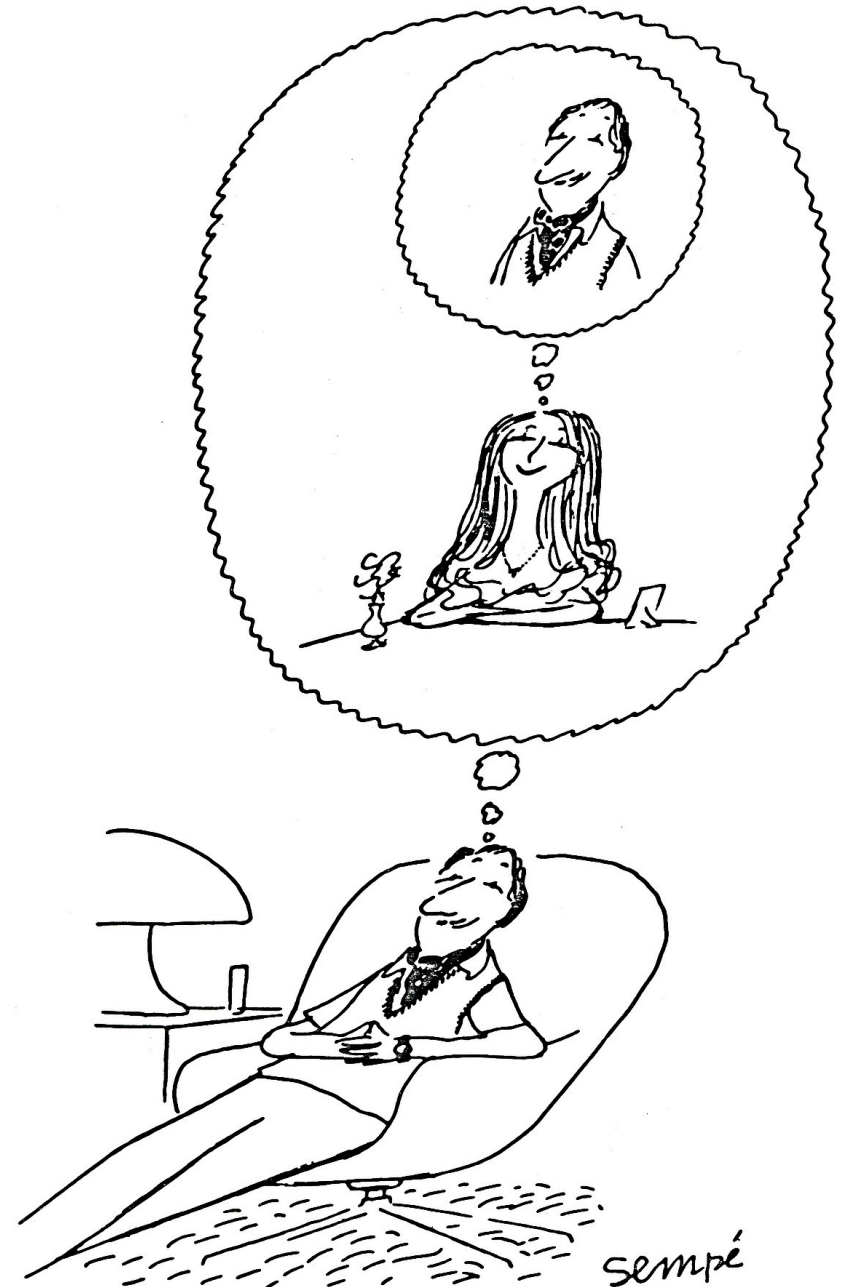
Metalanguage About Situations

The drawing on the right may be interpreted in three ways.

1. **Actual:** *Pierre is thinking of Marie, who is thinking of him.*

2. **Modal:** *Pierre is thinking of Marie, who may be thinking of him.*

3. **Intentional:** *Pierre hopes that Marie is thinking of him.*

In the second clause of #1, the verb *is* implies that Pierre's thought is true.

In #2, the verb *may* implies that his thought is a possible proposition.

In #3, the object of the verb *hopes* is a situation Pierre intends in some way.

Metalanguage in CLIP

Peirce's example of 1898 represents an intended situation.

    English: *That you are a good girl is much to be wished [by someone].*

    CLIP: ("is much to be wished" [Situation "You are a good girl"]).

English and CLIP for the sentences about Pierre.

    English: *Pierre is thinking of Marie, who is thinking of him.*

    CLIP: (thinkingOf Pierre Marie) (thinkingOf Marie Pierre).

    English: *Pierre is thinking of Marie, who may be thinking of him.*

    CLIP: (thinkingOf Pierre Marie) (possible [(thinkingOf Marie Pierre)]).
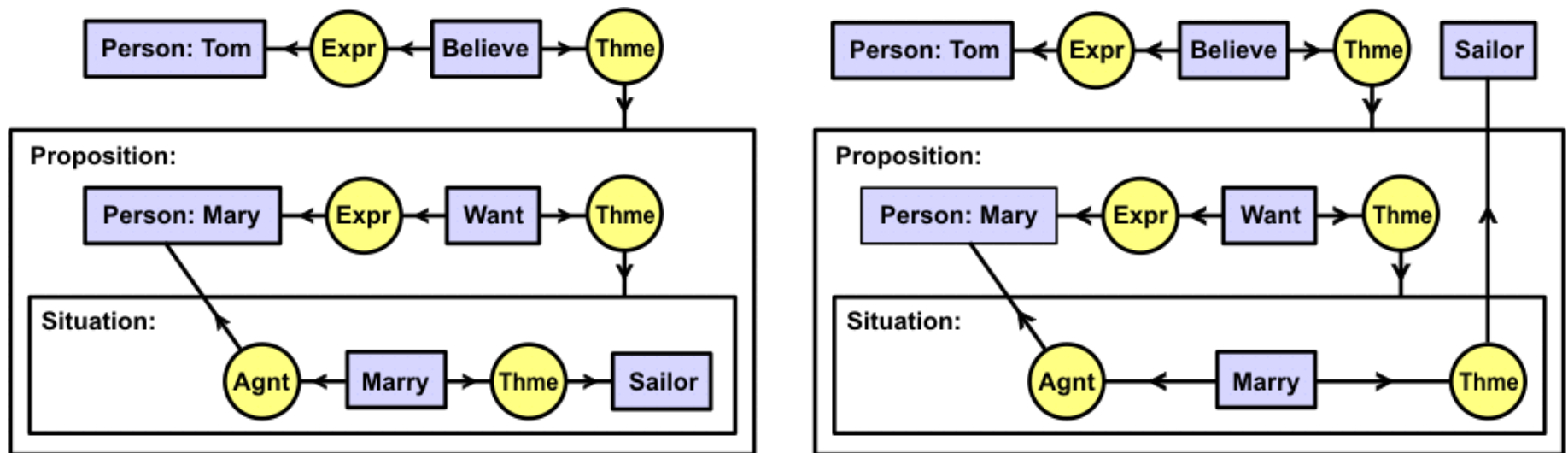
    English: *Pierre hopes that Marie is thinking of him.*

    CLIP: (hopesFor Pierre [Situation (thinkingOf Marie Pierre)]).

By itself, IKL does not support modal logic. But IKL at the metalevel can be used to define modal relations in terms of laws and facts.*

* See http://jfsowa.com/pubs/worlds.pdf

CGs for Propositions and Situations

The CGs above show two of the three interpretations of the sentence *Tom believes that Mary wants to marry a sailor:*

- *Tom believes a proposition that Mary wants a situation in which there exists a sailor whom she marries.*
- *There is a sailor, and Tom believes that Mary wants to marry him.*

For the third interpretation, the blue box for Sailor would be moved to the area of the proposition:

- *Tom believes that there is a sailor whom Mary wants to marry.*