Some Important Properties of Natural Language

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In this paper I describe some important properties of natural language that do not arise from usage of predicates or definitions of predicates. These properties seems important because they allow great flexibility in the use of language and efficient reuse of sentences.

- Hiddenly assumed first person perspective
- Sentence references
- Introspective quotes

Hiddenly Assumed First Person Perspective

By assuming a first person perspective, experiences can be described that are only accessible within the agent who speaks. Those experiences can be communicated to other agents with a similar experience.

For example:

> {My mom} baked a {cake}.
> {The cake} tasted {good}.

The description of the object "My mom" can only be understood if the receiver knows about people that are described relatively to the speaker. Similarly, the word "tasted" can only be understood if the receiver has experience with tasting food.

Using the Room Hypothesis of Common Sense, one can replace objects with numbers:

> 1=My mom
> 2=The cake
> {1} baked a {2}.
> {2} tasted {1=good}.

These numbers refers to objects in a "room" which makes it easier for the agent to construct a narrative of what is going on in the world around it. The "room" functions as an abstract simplification to remove all complexity and uncertainty that is irrelevant for the usage of this information.

Some predicates have arguments that are not refering to any particular object, but offers variations:

> The X tasted {1=good, 2=bad, 3=okay}.

Here, the words "good", "bad" and "okay" refers to subjective preferences. Good scores a high preference, Bad scores a low preference and Okay scores a neutral preference. The sentence "the cake tasted good" might invoke particular memory associations in the listener as a whole experience.

One advantage with an assumed first person perspective is that every sentence learned can be used to describe how another person experiences the world. The better a person is at describing its own experiences, the easier is it to model how other people think. This will we get back to later when talking about introspective quotes.

Sentence References

The property of referencing sentences makes it possible to perform activity based information processing or computation. Sentence references tie sentences together.

One can use a negative number to reference to some previous sentence. The particular meaning of a sentence reference depends on in which argument/object it is used and the meaning of the referred sentence.

For example:

> I wrote a {letter}.
> {My hand} was {shaking}.

Can be analyzed as:

> 1=letter
> I wrote a {1}.
> {-1} was {1=shaking}.

It is the hand that writes the letter that shakes, leading to shaky handwriting. The object "My hand" refers to some associated object of the writing activity. This is somewhat ambiguous since the hand is associated with writing, making it possible to interpret it as referring to some object instead of a sentence. However, if one thinks about "My hand" means, the question "which hand?" comes to mind and can not be answered without knowing which hand one writes the letter.

Another example that is less ambiguous:

> I took a {long walk}.
> {It} was {night} outside.

Can be analyzed as:

> I took a {1=long walk}.
> {-1} was {2=night} outside.

It was night outside when I took a long walk. The word "It" refers to the experience of walking.

One can imagine a language without sentence references but only operating on objects. However, remember that natural language is hiddenly assuming a first person perspective to better describe experiences. Sentence references make it easier to learn new sentences which are explicitly designed for improving communication of first person experiences, since sentences are hiddenly assumed to be used from a first person perspective.

People recall memories or dream up examples of what it means to take a long walk in the night. A robot reasoning about the example above might not be able to recall such experiences, yet it understand that it was night while taking a long walk. A back-reference improves description but does not enforce memory associations.

One problem with sentence references is that their interpretations are not exact. They can be used in many situations and carry many meanings. Ambiguity is just one problem. Another is that sentences can be ordered in a such way that it is difficult to know what exactly they refer to.

For example, by reversing the order of the previous example:

> {It} was {night} outside.
> I took a {long walk}.

One can interpret this as "It" not referring to anything in particular. It might be a way to describe the environment, or the world. The trick I used before to refer to the long walk I took, is kind of a hacky way of doing it, where sentence references are used to explain some connection to not require intuition.

Of course, one can use a future sentence reference like this:

> {+1: It} was {2=night} outside.
> I took a {1=long walk}.

By reversing the order of the sentences, they can give a new meaning than before. For example, seeing it was night outside, I decided to take a long walk. This could be a way of telling that the person talking is searching for a particular walking experience in the night, instead of just taking a long walk which happens to be in the night as a result of being absent minded. Those different kinds of states are significant for the first person experience.

This phenomena results from efficiently exploiting information states in a language. A language permits some variation that on the surface are equivalent ways of expressing the same thing, but the information about the variation might be used among agents to communicate something deeper.

Introspective Quotes

An introspective quote is an object which is described in the language itself. It makes it possible to communicate ideas to other agents assuming that they can interpret the same language.

For example:

> I told {you}:
> {Stop} doing {that}.

Or using a special object to signal that an introspective quote follows:

> I told {you} {the following}.

> {Stop} doing {that}.

Or using quotes:

> I told {you} "{Stop} doing {that}".

Or using the word "to" to connect sentences:

> I told {you} to {stop} doing {that}.

Each of these variations are equivalent representations of an introspective quote.

Assume that some agent only understands Norwegian. The following sentence is not using introspective quote in English only, but is a mixture of English and Norwegian:

> I told {you} "{slutt} med {det}".

Even if a person talks to others in a different language, the person can translate what is said or meant into its internal language and express the following:

> I told {you} to {stop} doing {that}.

Why is this true? Because even the language used by the other agents is different, it contains similar concepts and can be used to express the same semantics.

An introspective quote is a bit similar to a sentence reference grammatically, but they differs semantically. A sentence reference describes meaning of experiences "behind" the sentence, while an introspective quote is more like literally self-referencing the language itself.

The hidden assumption of first person perspective makes it easier to communicate ideas that are easily processed from introspective quotes.