Robert Kermode, 08 September ’24. *v 1.2.3*

Convention

In order to differentiate them from their familiar English counterparts, the terms defined in the model all begin with an underscore -hence ‘_sentence’, ‘_agent’, etc..

_Proposition

The *_proposition* expressed by a token _sentence *s* is the set of all and only the _token _sentences which express the same _proposition as *s.*

Comment
Note that the _propositional object of the _belief of _agent a_i is not a _proposition (*simpliciter*) but rather a _proposition-for-a_i. This and related concepts are not defined here - they are got by substituting ‘token _sentence _valued by a_i’ for ‘_true token _sentence’ in the relevant definitions.

Sameness of _proposition

Token _sentences s_1 and s_2 express the *same _proposition* just in case their respective constituent _phrases can be mapped in order one-to-one such that the two _phrases of each mapped pair have the same _meaning.

Example:

s_1: Bob’s dog is a mutt (spoken yesterday across town)

s_2: Fido is a Heinz 57 (spoken today here)

These two token _sentences express the same _proposition just in case the contained tokens of

a) ‘Fido’ and ‘Bob’s dog’ have the same _meaning, and
b) ‘is a mutt’ and ‘is a Heinz 57’ have the same _meaning (Note that the conversational context of s_2 would make typical tokens of, e.g., ‘That bottle of sauce is a Heinz 57’, in the moment, *false.* This is effectively the same point as made in the comment just below on sameness of meaning.).

Sameness of _meaning

Token _phrases p_1 and p_2 have the *same _meaning iff* their _tense-adjusted _moment sets are the same.

Comment
Conversational context may seem to present a problem here. In familiar theories, something like a speaker’s intentions fixes the meanings of token words and hence their truth. In the model, the concept of _agents’ _valuations of token _sentences must do the corresponding work. For the model to be accurate, then, there must be an intuitive concept of valuing of token sentences which rejects as apparently false contextually inapposite token sentences which might otherwise appear true. An example may clarify the point:

Example

In a conversation among politically educated people also versed in mountaineering, the following sentences are uttered:

"Hillary was Secretary of State for Barack Obama."
"Hillary was a New York senator."
"Hillary ran for President against Trump."

In this conversation, someone now says,

"Hillary climbed Mount Everest."

The present point is that the model requires there to be in reality an intuitively clear, pre-theoretical notion of sentence-valuation according to which the last sentence is valued differently than the first three. I think there is, but make this explicit to acknowledge that the point requires further discussion. (Sentence valuation has to underwrite word disambiguation, not vice-versa).

_Tense-adjusted _sentence

Call an ordinary sentence (of English, say) "tense-adjusted" *iff* it is expressed in the historical present tense with exact time and location prepended.

The model is now stipulated to include among its stock of _words,

- sound-alike correlates of the words of English (say) used to express time and location in tense-adjusted sentences.

A token _sentence is *_tense-adjusted iff* it matches the grammatical form of an ordinary tense-adjusted sentence – that is, if it has prepended to it _words corresponding to an ordinary, grammatically correct expression of time and location such as would appear in an ordinary tense-adjusted sentence.

Finally, a *set* of _sentences is _tense-adjusted *iff* it contains only _tense-adjusted _sentences.

Comment

Limiting attention to _tense-adjusted _sentences is a device to permit comparing _sentences _true at different _moments. To keep with the thought experiment, the required _words are just sequences of sounds.

Example

A _tense-adjusted correlate of the _sentence,

$s_{1:}$ Fido was on the rug.

might be

$s_{2:}$ Monday, May 1st, 2022 at noon, in the entrance at 999 Mongrel St. in Toronto, Fido is on the rug.

_Moment set of a phrase at a _moment

A set *M* of _sentential functions is the *_moment set* at a _moment *m* of a _phrase *p iff M* is the set of all and only the _sentential functions which upon completion with *p* at *m* would result in a _true token _sentence.

Comment

The thought, roughly, is that the _moment set of a '_subject' _phrase at a _moment is the set of all '_predicate' phrases which when combined with it would make a _true _sentence; the _moment set of a _predicate _phrase, the set of all _subject _phrases which would do likewise.

_Moment

A _moment is a complex of the form $\langle t, \mathbf{x}, \boldsymbol{\xi}, C, a \rangle$.

_Sentential function

A *_sentential function* is a construct got from an atomic _sentence by replacing a _phrase within it with a placeholder variable.

_Atomic _sentence

A _sentence *s* is *_atomic* for the purposes of the model *iff* there is no _phrase which is a proper part of *s* which is itself a _sentence.

_Phrases

Any non-empty ordered set of _words is a *_phrase*.

_Words

The model is augmented to include

- A large set of word-like strings of sounds, *_words*, $\{w_1, \dots, w_m\}$.

_sentences are now constrained always to be decomposable into sequences or ordered sets of _words.

_True

A token _sentence *s* is *_true iff s* is an element of a maximal _belief set B_T and the joint aggregate of B_T would be lower if *s* were removed.

Maximal _belief set

B is a maximal _belief set *iff* the joint aggregate _value of *B* is greater than or equal to the joint aggregate _value of any other set, *B′*.

Joint aggregate _value

The combined or joint aggregate _value for the _speakers of a _language of a set of _sentences *B* is the sum of the aggregate values for all _agents of *B*:

$$J(B) = \sum_{i=0}^{n} A_i(B)$$

where *i* ranges over all _agents who speak the _language.

_True for a_i

A token _sentence *s* is *_true for* a_i *iff s* is an element of a maximal _belief set *B* for a_i and the aggregate of *B* would be lower if *s* were removed.

Maximal _belief set for a_i

B is a maximal _belief set for _agent a_i *iff* the aggregate _value of *B* for a_i is greater than or equal to the aggregate _value for a_i of any other set, *B′*.

Comment

This definition allows for a tie for first place. This is presumed to be highly improbable but possible. At stake here are questions about whether truth is absolute or relative, which the model does not adjudicate.

Aggregate _value

The aggregate _value A_i of a set of token _sentences *B* for a_i is,

$$A_i(B) = \sum_{j=0}^{n} V_i(s_j, B \setminus \{s_j\})$$

where s_j are the elements of *B.*

_Observation and _theory _sentences

A token _sentence *s* is an *_observation* _sentence for a_i *iff* the _value of *s* is independent of *B* and varies with <*t*, **x**, **ξ**>. A theory _sentence for a_i is a token _sentence whose _value does vary with *B*.

The model, fourth and final refinement – _context

The fourth and final parameter to add is a set, *C*, of token _sentences representing the _sentences heard at recent times $t' < t$ by a_i at *t*, excluding *s* itself – the *_context* of *s*:

$$V_i : s, t, \mathbf{x}, \boldsymbol{\xi}, B, a_j, C \rightarrow v \qquad \text{(final pass)}$$

A _sentence token now is a complex of the form $<s, t, \mathbf{x}, \boldsymbol{\xi}, a, C>$.

Comment

The elements of *C* are token _sentences, each with its own _context. But C may be empty, just as not all sentences require a context to be intelligible.

The model, third refinement – utterer

The third parameter to add is an _agent, a_j, meant to be thought of as the _agent who uttered the _sentence:

$$V_i : s, t, \mathbf{x}, \boldsymbol{\xi}, B, a_j \rightarrow v \qquad \text{(fourth pass)}$$

A _sentence token now is a complex of the form $<s, t, \mathbf{x}, \boldsymbol{\xi}, a>$.

Comment

It may be tempting to conceive of the _value function as a kind-of placeholder for the enormously complex algorithm which governs the processing of information and the generation of behaviour in a cognitive agent -an algorithm, success in the divining of whose details one might think is the measure of the cognitive scientist’s or philosopher’s worth. This emphatically is not its point. Its point is solely to schematize the resources needed to get semantics off the ground – what minimally is required to give rise in a system to concepts cognate to the concepts of truth, meaning, etc.. Its significance is that it shows that truth and meaning can be made sense of without a world of things to talk about.

One point of this is that although _value is specific to an _agent, it is not ‘proximate’: what matters is the variation of _value with utterer, not something in the nature of a ‘perceived’ utterer. The model can allow that, say, an _agent would highly _value a _sentence *s* uttered by a_1 only because -we can suppose- he ‘mistakes’ a_1 for a_2 and as a consequence -we want to say- misinterprets the _sentence. The means to distinguish mistakes as such does not need to be built into the _value function. All we need is that a_i at *t* and **x**, focused on $\boldsymbol{\xi}$ and _believing the elements of *B*, _values *s* when it is uttered by a_1.

The model, second refinement – _beliefs

The next parameter to add is a set, *B*, of token _sentences representing the token _sentences believed by a_i:

$V_i : s, t, \mathbf{x}, \boldsymbol{\xi}, B \rightarrow v.$ (third pass)

Comment

B makes the _value function impredicative, as plausibly it should be. What is newly _valued may depend on what is already _valued.

The *B* parameter is not a constituent of the token _sentence _valued.

The definition just above of *_belief* is updated to include the prior _beliefs parameter. That is, an _agent _believes a _sentence just in case

$V_i (s, t, \mathbf{x}, \boldsymbol{\xi}, B) > 0.5$

As refinements are made, associated definitions are henceforth implicitly updated.

_Belief

An _agent a_i *_believes* a token _sentence $<s, t, \mathbf{x}, \boldsymbol{\xi}>$ *iff* a_i heard or has entertained $<s, t, \mathbf{x}, \boldsymbol{\xi}>$ and $V_i (s, t, \mathbf{x}, \boldsymbol{\xi}) > 0.5$. _Agent a_i *_disbelieves s iff* a_i heard or has entertained $<s, t, \mathbf{x}, \boldsymbol{\xi}>$ and $V_i (s, t, \mathbf{x}, \boldsymbol{\xi}) < 0.5$.

The model, first refinement – focus of attention

To reflect the fact that our reaction to a sentence may depend on where we are looking, what we may be touching, etc., a second 3-dimensional position argument, $\boldsymbol{\xi}$, is added to represent agent a_i's focus of attention:

$V_i : s, t, \mathbf{x}, \boldsymbol{\xi} \rightarrow v.$ (second pass)

A _sentence token now is a complex of the form $<s, t, \mathbf{x}, \boldsymbol{\xi}>$.

Comment

There are differences between _sentence tokens and sentence tokens as sometimes understood. Notably, one utterance of a _sentence by an _agent may correspond to many tokens heard by other _agents.

_Pleasure

The model is augmented to include

- A model-specific pleasure, *_pleasure,* which is experienced when some token _sentences are encountered (novel *_propositions,* defined below). The character of _pleasure is the same for all _sentences.

Comment

_Pleasure, unlike _value, is meant to be some nice feeling distinct from any familiar feeling. It is meant to correlate to the real-world benefits truth facilitates getting, including avoiding familiar pains. It serves in the model as the only motive for exchanging _sentences – for '_conversing'. The sole goal of talk in the model is to maximize _pleasure. It is a lesson of the model that this one-dimensional _pleasure, in contrast to life's many pleasures and pains-avoided, is sufficient for semantics.

The base model

The first iteration of the model consists of

- A large set of sentence-like strings of sounds, *_sentences*, $\{s_1, ..., s_k\}$.
- A large set of speakers or *_agents*, $\{a_1, \ldots, a_n\}$.
- For each _agent a_i, a *_value* function,

$$V_i : s, t, \mathbf{x} \rightarrow v \qquad \text{(first pass)}$$

where s is a _sentence, t is a time, $\mathbf{x}$ is a point in 3-dimensional space representing a_i's position, and v is a number between 0 and 1. 0 represents maximum dis-value, 1 maximum value, and 0.5 indifference. A _sentence token is a complex of the form $<s, t, \mathbf{x}>$; a _sentence type is just s.

Comment

_Sentences are meant to be apparently semantically inert. They're just sequences of sounds. _Value is the model's counterpart to the feeling associated with a real-world sentence when what it says is the case, even if trivial or banal. It correlates to degree of belief or confidence familiar from decision theory. Intrinsically, though, it is just a feeling.