A Model of Language in a Synchronic and Diachronic Sense

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Abstract

Language can be modelled in various ways, highlighting either its social or systemic character. I assume that language is a normative phenomenon enabling speakers to communicate. At any particular time language is used, however, we are capable of determining a function which maps the expressions produced using this language to their meanings. In this contribution I propose a functional model of language in a synchronic sense. This model also solves various complications with ambivalence, etc. Then, I also propose a model of language in a diachronic sense as a function from possible worlds and time instants to languages in a synchronic sense. In this way, the intuitive idea that language changes is captured. Both models are constructed to be convenient tools mainly for the investigation of semantic properties of expressions of that language.

Keywords: synchronic, diachronic, language, code, David Lewis, Pavel Tichý.

1 Introduction

As is well known, a synchronic investigation of language deals with a language or its parts studied as a fixed phenomenon existing at a given moment of time, whereas a diachronic investigation of language concerns the development of language or its parts over time. The synchronic / diachronic distinction was introduced by Ferdinand de Saussure in his Course in General Linguistics (1916/1959) and it is a standard part of a linguist’s conceptual armoury. Among philosophers, on the other hand, this distinction is scarcely known and it is rarely used by them in practice. One of the probable reasons for this is their preference for considering language in a synchronic sense. What is perhaps more important is that philosophers usually view language only as a tool for describing the world and its objects, while the synchronic / diachronic distinction applies to language studied as a ‘worldly’ object.

The distinction reflects the following familiar and uncontroversial fact, and one of its immediate conclusions:
Language changes over time.

What holds about a language or its part at a given moment need not hold about it or its part at another moment.

The distinction also suggests that it is possible to study language matters without reflecting on their changes over time.

It is obviously important to discriminate between synchronic and diachronic approaches in various kinds of investigation of language. This is especially true when one is faced with the fact that one can or cannot abstract a temporal (or modal) aspect of language away.

My main objective in this study is to develop a model of language in both a synchronic and a diachronic sense, a model acceptable to a wide community of logicians, philosophers and semanticists of language. The model is function-based in the sense that synchronic language is a result of abstraction from the temporal (and modal) aspect of language in a diachronic sense, i.e. it is a (functional) value of a function which is language in a diachronic sense.

The model is presented in Sections 3 and 4. Before that, several preliminary issues will be discussed, esp. the explication of meanings as adopted in the model (Section 2) and two possible general views on language (Section 1). Needless to say, I deal primarily with models of natural languages, not formal ones.

2 Language as a normative system and language as a code

To explicate the notion of language is one of the ultimate goals of the philosophy of language, and some other disciplines. Various approaches to language have been proposed. Our approach follows in the footsteps of F. de Saussure and N. Chomsky, and also formal semanticists such as R. Carnap, R. Montague, etc., who viewed language as a sign system. They stressed the structural aspect of language. A typical idea related to this is compositionality, which captures the idea that infinitely many complex language objects can be generated from a relatively simple (and knowable) basis.

1 I have discussed the topic (and suggested the key part of the model) of language in both a synchronic and a diachronic sense in several of my papers published in Czech (2005 - 2007, 2012) and also in my Czech book (2009). I talk about a model of language rather than its explication because I purposely simplify the conceptual situation. On the other hand, it still holds, as it does in the case of faithful explication, that not every intuitive feature of a modelled entity is captured by its model (it is often the case that the rationalization of our intuitions into a rigorous model requires alterations to be made to them).
If such an approach is adopted, it is then not unnatural to view language as a code: a more or less regular system associating expressions with meanings, i.e. a function mapping the former to the latter.

However, some analytical philosophers, e.g. W. V. O. Quine or, in his later years, L. Wittgenstein, vehemently opposed this somewhat ‘Carnapian’ concept, claiming that language is a social practice.

The disproportion between the two views was firstly seriously discussed by David Lewis in his noteworthy paper *Language and Languages* (1983, esp. 163-4). Lewis developed both views, but concentrated especially on language as a social phenomenon and the related problem of language convention.

According to my personal construal, language is a normative system which enables people who accept it to communicate meanings using audio, visual or other kinds of expressions, i.e. material means of communication which are exhibited in communication situations.

This (preliminary) specification of language is intentionally rather general in order to better capture the view that language is also capable of communicating meanings of a non-factual nature, e.g. individual feelings or non-verbalized tensions. On the other hand, this specification is limited in the sense that kicking somebody cannot be normally counted as a linguistic behaviour, though it can be so under certain special circumstances.

Relevant topics have been discussed by a number of philosophers of language, e.g. J. L. Austin, J. Searle, H. P. Grice, and C. S. Peirce, to name a few. Also, the normativity of language has been studied, e.g., by D. Davidson and D. Lewis. The reader can surely name many other writers.

As far as I know, however, these writers have not proposed a concrete model developed within a rigorous, logical framework. Needless to say, neither do logicians offer any paradigmatic explication of the notion of a normative system (indeed, how may one explicate even the notion of a norm?) – they offer only isolated suggestions. The current text makes no advances in this area either: no model of language as a normative system is proposed here. Nevertheless, we can rely here on the fact that some features of language which concern us can be studied even when limiting our attention to language as a code.

Note, however, that the nature of language as a normative system, as I understand it, is such that it produces or warrants this or that code. From another viewpoint, language as a code is something which is abstracted or idealized from our communication by means of language as a normative system. (Of course, language as a normative system usually warrants more

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2I thank my colleague P. Kuchyňka (cf. his 2012) for inspiring me to think about language in such a way.

3By a typical communication situation I mean, for instance, metaphoric speech, irony, or informative discourse.

4One can state various conditions under which something may be considered communication in a given language; this is, however, outside the scope of this paper.
than one code. These codes differ as regards the meanings of some expressions. This issue can be partly resolved as an ambiguity problem, cf. below, and partly as an idiolectic issue, which will not be discussed in this paper.)

To illustrate this portrayal, the grammar of the English language and its vocabulary (which in fact render the language a code) was abstracted by linguists from the everyday communication of users of that language. English language textbooks then describe a number of (types of) communication situations in which the English language is employed.

To repeat one important idea, we can, when studying various language problems, abstract away from the whole social reality of language, thus reducing language to a mere code. A model of such a code will be presented after our discussion of meanings which are components of codes.

3 A model of meaning

To propose a definite model of language, some kind of explication of meaning needs to be adopted. Since the intended model will be developed in terms of functions, the model of an expression’s meaning we are looking for should be formulated in terms of functions as well.

Such a model or explication of meaning has been proposed by a line of writers extending back to G. Frege. Though the model is reductive to some extent, it appears to be very useful. Meanings of singular phrases, predicates or sentences are explicated as individuals, classes of individuals, relations between individuals, or truth-values, i.e. as familiar set-theoretical entities.

Extensionalistic semantics, which adopts the semantic model sketched above, was found to be insufficient due to its disregard of modal and temporal variability. Replacing extensionalistic semantics, intensional semantics explicates meanings of expressions with variable reference as possible world intensions, i.e. as functions from possible worlds and moments of time to common extensional entities. This semantic theory was developed mainly by writers such as R. Montague, D. Kaplan, M. Cresswell, R. Dowty, P. Tichý, R. Muskens and others.

It was as early as in the 1940s that R. Carnap noticed that extensions and intensions are too coarse-grained to be adequate models of meanings because meanings are structured. The principle of compositionality captures the complexity of expressions by stating that the meaning of a complex expression is built up from the meanings of its subexpressions. However,
common set-theoretical objects assigned to subexpressions do not form any such complex whole.\(^7\)

The depth of the problem of structuredness had already been fully realized by the mid-1970s (D. Lewis, M. J. Cresswell), whereupon the era of hyperintensional semantics began. In a narrower sense, it is a semantic theory which models meanings of expressions which are equivalent and thus substitutable for each other in intensional, but not in hyperintensional contexts.

To illustrate the problem: according to intensional semantics, the meaning of a sentence is a proposition, i.e. a class of worlds in which the sentence is true. The meanings of sentences such as “2+3=5” and “\(\sqrt{25}=5\)” are thus identical, as it is the only proposition true in all possible worlds and times. In other words, “5”, “\(\sqrt{25}\)” and “2+3” are substitutable for each other, since their meaning is also the same, i.e. the number 5. This is at odds with our intuition regarding their distinct meanings. Moreover, the argument “Xenia believes 2+3=5” / “Xenia believes \(\sqrt{25}=5\)”, which deploys hyperintensional contexts, is ranked as valid in such semantics, which is obviously wrong. A more adequate semantic theory is thus needed.

The quest for structured meanings in semantics increased in intensity during the 1980s (esp. M. J. Cresswell, J. C. King, G. Bealer, E. Zalta). In the last two decades, the topic has been treated frequently in the philosophy of language.

The hyperintensional semantic theory I am influenced by, and even partly explicitly used in this paper, was propounded by P. Tichý as early as in the mid-1970s. I cannot argue in favour of it, see thus esp. Tichý (1988, 2004).\(^8\) Neither can the details of Tichý’s sophisticated semantic system be given here. I cannot thus carefully introduce Tichý’s key notion, which he called “construction”. Instead of constructions, which might be confusing for some readers, I will speak about procedures.

Procedures are abstract extralinguistic entities fine-grained in structure. They are somewhat akin to functions in the older sense because of their complexity. Procedures are specified partly with the help of the entities they determine. The determined objects are common extensions, intensions, or other procedures (or even nothing at all). Procedures can be equivalent, i.e. they determine the same object, without being identical. Procedures are suggested as explicata of a language expression’s meanings.

The Tichýan (post-Fregean, Churchian) semantic triangle is then as follows:

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\(^7\)The only object which could somehow combine them together would be a relation not mentioned in the expressions. However, the main problem here is that such a relation should be connected to its arguments by some other relation, and this leads us to Bradley’s regress.

\(^8\)For some recent application of Tichý’s semantic theory see Duží et alii (2010) or the present author’s (2009).
an expression $E$

$$E \text{ expresses (means) in } L:$$

a construction $C$ = the meaning of $E$ in $L$

$$C \text{ constructs:}$$

an intension / non-intension = the denotatum of $E$ in $L$

If the denotatum is an intension, as in the case of ‘empirical’ expressions such as “a dog”, “the king of France”, or “It rains in Paris”, the value of that intension in a given possible world and moment of time is the referent of that expression. In the case of ‘non-empirical’ expressions (such as “and”, “2”, or “+”), the denotatum and referent can be identified.

Note that the semantic scheme encapsulates the notion of synonymy as having the same meaning and distinguishes it from equivalence of expressions, which is based on the equivalence of expressions’ meanings (i.e. procedures). Moreover, the scheme also encapsulates the notion of codenotation as having the same denotatum and distinguishes it from coreference having the same referent in a given world and time. The four notions are in obvious definitional relationships, cf. also below.

4 A model of language in a synchronic sense

As I suggest above:

Language in a synchronic sense is a function from expressions to meanings.

The aim of this section is to explain and sufficiently specify this proposal. Though it is clear from the preceding section which kinds of meanings are considered in this model, questions may arise as regards modelling language as a function. Further difficulties discussed in this section concern homonymy and ambivalence. The model I propose will also be compared with a model of a synchronic language as a class (set) of $⟨$expression, meaning$⟩$ pairs.

4.1 ...and the problem of expressions

The notion of language expression can be appropriately modelled as a sequence of signs.\footnote{Being influenced by common usage in logic, expressions are considered here as syntactic entities, not as syntactic items plus their meanings.} The word “table”, for example, is a function assigning “t” to 1, “a” to 2, etc., but assigning nothing to numbers greater than 5. Signs
are considered here as *types*, i.e. abstract, ideal correlates of their sensually perceivable manifestations, *tokens*. When explicated as sequences, i.e. compound (non-primitive) entities, expressions can be subjected to various operations (substitution and quantifying in, among others).

Every language accepts certain classes of audio, visual or some other material phenomena which are recognizable by speakers of the language as tokens of certain expressions. Of course, an individual’s careless articulation of a certain word, or someone’s clumsy scrawl, are beyond the boundary of entities which count as an expression’s tokens.

Realize thus that the notion of an expression’s token is a *language relative* one. The same holds for an expression’s type. Further realize that to fully specify (the class of) admissible tokens of types of some language expressions would be a thankless task (of course, every decent language textbook contains at least some elements of this specification).

However, a lot of applications of language models are possible even when abstracting away from the multifarious peculiarities of expressions and their tokens. In logic, a routine technique enabling such abstraction is Gödelization, i.e. mapping of expressions to their unique numerical correlates.

When expressions are replaced by their Gödel numbers, language in a synchronic sense is seen to be a function from (at least natural) numbers to meanings. Such functions can be called *numerical codes*.\(^{10}\)

Note that thanks to Gödelization, we are not restricted to studying particular functions as synchronic languages defined for over a particular alphabet, say that of English or predicate logic; we may consider any given linguistic system. This idealization gives generality to our model.

4.2 ...and the problem of meanings

Our model incorporates partiality, and so some expressions, their Gödel numbers, end up without a meaning. Our model is thus capable of capturing the intuitive idea that some expressions belong to a particular language, yet they are without a meaning within it.

In formal languages we usually exclude this possibility (cf. the notion of well-formed formula) but it should be remembered that we intend here to create an adequate model of natural languages. Nevertheless, some will still say that meaningless expressions cannot be considered as expressions of this or that natural language. However, an opposite intuition also exists and is thus legitimately built into our model: we may accept some expressions as possible expressions of a certain language, i.e. as lacking a meaning now but having the potential to gain a meaning in the future. For example, the Ger-

\(^{10}\)I have borrowed the term from P. Tichý (1988), for whom codes are functions from real numbers to meanings (i.e. his constructions).
man word for ‘regularly’ \(11\) “regelmäßig”, may one day become a meaningful word in English, \(cf\). the current English expressions “ersatz” or “blitzkrieg”.

The concept of language being composed exclusively of meaningful expressions is characteristic of a model of language as a class (set) of couples (expression, meaning). This set-theoretical model has one advantage in comparison with a functional model; it offers an elegant solution to homonymy. English is simply modelled as a class containing couples such as (“bank”, ‘an institution administering money’) and (“bank”, ‘a part of a river’).

With a functional model we have two reasonable ways of resolving such ambiguities. In natural language analysis, theoreticians such as R. Montague or even S. Kripke disambiguate homophonic expressions into a variety of particular expressions equipped with numerical subscripts (these are parts of our metalanguage). The two distinct meanings mentioned in our example of homonymy are thus associated with “bank\(_1\)” and “bank\(_2\)”.

We may prefer another way which was suggested, but without explaining its details, by D. Lewis (1983). It consists in the association of expressions not with sole meanings but with whole sequences of meanings.

This model easily captures, e.g., the fact that one (grammatical) predicate such as “friend” is associated with several similar meanings which differ only in their arity – it is either a procedure producing a property of individuals, or a procedure producing a relationship between individuals. The proper arity of a predicate term is recognizable from the context.\(^12\) In a set-theoretical model, however, a single intuitive predicate is explained as a class of predicates such as (“friend”, ‘be a friend’) and (“friend”, ‘be a friend of’), which is rather less intuitive.

There is even another kind of syntactico-semantic contextuality, which is essential to language\(^13\) and is appropriately solved by a functional model of language. Using a concrete example, “black” is a simple predicate when applied to individuals and is a property modifier when applied to a property; this can be ascertained from context of phrases such as “Fido is black” and “Fido is a black horse”. Such expressions thus change their semantic category in different contexts.\(^14\)

Since we view sequences of meanings as partial functions, it cannot be excluded that an expression may have only one meaning as a sole value of the respective partial function. However, it is perhaps more interesting that

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11 Double quotation marks are always used for citing expressions. Single quotation marks are used to indicate meanings (i.e. procedures) or, sometimes, to indicate an altered meaning.

12 Which has been recently stressed by Zouhar (2011).

13 Frege stressed this contextuality of language in his “never ask for meaning in isolation” slogan.

14 Stress on the syntactic aspect is a probable source of some of the problems in E. Husserl’s theory of syntactic categories which was later developed by K. Adjukiewicz and J. Bar-Hillel (the theory was utilized in semantic theories by R. Montague, M.J. Cresswell and others).
we can arrange that primary meanings occur at certain positions in those sequences, while at other positions alternative meanings (such as meanings in situations involving joking or metaphorical speech, etc.) occur. Of course, meanings for syntactico-semantic contexts are located at some other positions, etc. 15

I believe the capability of the model to associate expressions with not only their primary meanings but also with meanings for various typical communication situations is its great advantage.

In our natural understanding of things, we do not think of mere semantic values of meanings. Rather, couples ⟨description using a name of a typical communication situation, meaning⟩ come to our minds when asked for the meanings of expressions we use. As an illustrative example, these are couples ⟨primary meaning for informative communication, $M_1$⟩, ⟨meaning during irony, $M_2$⟩, ⟨obsolete meaning for informative communication, $M_3$⟩, . . . , where $M_1$, . . . , $M_3$, . . . are distinct meanings of the same expression. Of course, the first members of the couples can be reduced to (names of) communication situations. It should also be realised that communication situations can be assigned numbers, and thus coded. Thus we would obtain – again – a model as a function from numbers to sequences of meanings.

It also cannot be excluded that the contexts and communication situations represented in the functional values of such a language model are shifted to its arguments. Such language would be a function defined on couples ⟨Gödelized expression, communication situation/context⟩. The couples can be coded, and we thus obtain – again – language as a function defined on numbers. Of course, Gödel numbers understood as explicating ⟨expression, communication situation/context⟩ pairs make the use of sequences of meanings unnecessary.

These kinds of ‘reinterpretation’ show that numerical codes has the highest level of unity and generality, thus they are most preferable.

4.3 . . . and the functional character of explication

In comparison with the other models discussed in this section, it is only the simple functional model that enables comfortable work with semantic properties. To obtain the meaning $M$ of a certain expression $E$ in a language $L$ it is enough to apply $L$ to $E$, writing this:

$[L \ E]$. 

15Sequences of meanings are also useful in the case of the surprising yet inevitable phenomenon of the hierarchized meanings of some words, e.g. “true” and its meanings ‘true’₁, ‘true’₂, . . . , ‘true’ₙ; cf. the present author’s work on semantic paradoxes and the explication of semantic notions (e.g. 2012a).
The denotatum of expression \( E \) in language \( L \) is in fact the product of \( E \)’s meaning \( M \) in \( L \), i.e.:

\[
\text{[TheProductOf \([L \ E]\).}
\]

Etc.; cf. (Raclavský 2012b). This could not be simpler and more straightforward.

In the case of a model of language as a class of couples \( \langle \text{expression, meaning} \rangle \), however, we would have to separate the second component \( M \) from the couple \( \langle E, M \rangle \). To answer the question “What is the meaning of the ambivalent expression \( E \)?”, we would not only need to deliver one meaning (after the disambiguation of \( E \)), but a whole list of meanings, i.e. \( M_1, M_2 \), etc., which we would separate from the couples \( \langle E, M_1 \rangle, \langle E, M_2 \rangle \), etc. It is thus not merely a functional application.

Further complications arise when working with more than one language. In the case of the functional model, the language component is already involved (cf. \([L \ E]\)), thus \( L \) can be easily transformed into a variable for languages; one can then quantify over languages (in a synchronic sense) and compare semantic properties across languages.

5 A model of language in a diachronic sense

As was already explained briefly in the introduction:

*Language in a diachronic sense is a function from possible worlds and moments of time to languages in a synchronic sense.*

The temporal aspect captured by this model needs perhaps no explanation, as it is clearly a correlate of the temporal variability involved in the reality of language. Note that any change in a language, e.g. in the meanings of its expressions, corresponds to the exchange of a value of the function (which is a model of the language in a diachronic sense).

On the other hand, the modal aspect seems to be questionable. Its suspiciousness probably stems from the fact that linguistic research is normally focused on the actual, and not the counter-factual, state of language. Nevertheless, alternative (counterfactual) forms of a language are not the exclusive speculative domain of philosophers: in diachronic linguistics the researcher who asks whether an investigated feature of a language might be different is also asking a counter-factual question.

\[\text{[In the case of functional models with sequences of meanings, particular numeric positions would need to be added to give a concrete result.}\]

\[\text{[Such changes are enforced by the fact that language in a synchronic sense is an exact object, mathematical function, thus any change in any of its parts implies a change made to that function.]}\]
5.1  . . . and the functional character of explication

As at the end of the preceding section, let us think about the functional construction of our rigorous notion. To reach the goal of our explication we strive for the answers to questions such as “What is the meaning of this or that expression in this language?” We do not intend to leave it to intuition, which is unclear and/or confused – nothing must be left to guesswork. After explicating the notions of expression and meaning, we defined the term “language” as a functional entity for both the synchronic and diachronic models, thus enabling semantic issues to be studied as certain functional consequences.

As mentioned above, the meaning of the expression $E$ in $L$ is yielded as a result of the application of $L$ on $E$, i.e. $[L \ E]$. (Analogously for denotation and reference.) The model of language in a diachronic sense, $DL$, is also constructed as a function; the meaning of $E$ (to give an example) is yielded as a result of multiplied application, viz.:

$$[[DL \ W \ T] \ E]$$

where $W$ is a given possible world and $T$ a given time instant.

Finally, notice that semantic properties of expressions are (strictly speaking) never studied within language as a diachronic whole, but only in particular synchronic ‘slices’ of it. If we ask, for example, whether the phrase “The whale is a mammal” is analytic in English, we do not really intend to ask whether the expression has that property in English as a diachronic language because the answer is trivially “No” – language evolves, and so it changes its semantic properties. We rather mean to ask whether the expression is such within a particular synchronic ‘slice’ (or a particular sequence of ‘slices’) of that language, in which its analyticity depends on the analyticity of its fixed meaning.

A number of philosophical puzzles can be easily solved if careful notice is taken regarding whether or not the language in question is moving to its temporally subsequent stage. Not only Wittgenstein was puzzled by the introduction of the term “meter”, for instance. However, it should be obvious that two distinct languages in a synchronic sense must underlay the very setting of the standard-meter puzzle whereas the two languages differ as regards their involvement of the very term “meter” as a meaningful expression. However, lack of space prevents me from discussing the whole issue here. It is similar in the case of other such puzzles; but at least one clear example would be appropriate here. Let us remember Quine’s (1962) answer to Marcus’ (1962) defence of modal logic. Marcus rightly mentioned that “Hesperus” (if we adapt her example a little) is a hidden description, which explains why “Venus is Hesperus” is not analytic. However, Quine did not discuss English as a synchronic language, EN$_1$ or EN$_2$, but as a diachronic
language, DEN. He claimed that “Hesperus” can be introduced as an alternative label (i.e. a proper name) for Venus, and thus it is a contingent fact that “Venus is Hesperus”. The switch from EN₁ to EN₂ is the proper source – and trivially so₁₈ – of the non-analyticity of the sentence. At the same time, however, non-Quineans were right in stating that “Venus is Hesperus” is clearly analytic: in EN₂ it is indeed so.

5.2 ...and the problem of the variability of bases, and a model of language in an enhanced diachronic sense

In this section I am going to specify the model of language in a diachronic sense in one particular detail. I will thus avoid the objection that the basis for language can vary over time. Such a change in basis yields a deeper change in language than the mere exchange of its synchronic slices \( L \) and \( L' \), which was discussed in the preceding subsection. The model of language in an enhanced diachronic sense is capable of coping with such changes. The model presented at the beginning of Section 4 is only suitable for investigating languages with a fixed basis.

Firstly, let us explain the consequences of changing a basis. Recall the fact that each function is defined over a specific object basis. For instance, a property explicated as an intension having classes of individuals as values is only defined over a particular collection of individuals (and collection of possible worlds and moments of time, which will be ignored for the present moment). Let \( B=\{I_1, I_2, I_3\} \). No extension of that property can involve, e.g., \( I_4 \) because \( I_4 \) is not in \( B \). If this basis is changed, the property is changed as well. Since properties are denotata of some expressions, changes in \( B \) give rise to semantic changes in \( L \) in question.

The properties and other objects denoted by the expressions of \( L \) are produced by procedures which are defined by this production, thus meanings communicated by that language change as well. If synchronic languages \( L \) and \( L' \) are defined over distinct bases \( B \) and \( B' \), their meanings differ significantly. They thus cannot be possible values of one and the same language in a diachronic sense. Such a language in a diachronic sense is defined over a particular basis, say \( B \); let us call this diachronic language \( DL_B \). In other words, synchronic languages of one particular diachronic language are all defined over one particular basis.

To capture the changes a language undergoes when its basis changes, we have two possibilities. One possibility is to take into consideration \( DL_B, DL_{B'}, \) etc., which leads to the fragmentation of answers concerning semantic or other features of that one intuitive language. It is thus more promising to deal with one entity comprising the changed languages. This entity is the given language in an enhanced diachronic sense: a diachronic language

₁₈I thus find Quine’s notion of analyticity uninteresting.
with the basis \( B_U \), which is the union of all bases of \( DL_B \), \( DL_{B'} \), etc., i.e. \( B_U = \{ B, B', \ldots \} \).

The language \( DL_{BU} \) seems to have one undesirable property. Imagine that \( B' \) contains \( I_4 \), an individual which cannot be discussed in any synchronic language of \( DL_B \) because \( B \) does not contain it. The adoption of \( L_B \) into \( DL_{BU} \) leads to the consequence that (for example) a property denoted in the original \( L_B \) is now (re)constructed over \( B' \). It means that any extension of that property also has to be defined over \( B' \). Then, to mimic the same extension (and property) from the original \( L_B \), the truth-value assigned to \( I_4 \) in this extension,\(^{19}\) as well as the anti-extension, in the modified \( L_B \) has to be a partial gap, i.e. a non-existent value.

Such a reform of the original language \( L_B \) to its modification, which is a value of \( DL_{BU} \), thus inevitably causes particular semantic changes. This is an undesirable result at first sight, but it must be realized that this feature of the model appropriately corresponds to the fact that, for instance, a certain value of \( DL \), i.e. \( L_B \), is limited in the sense that it cannot ascribe anything to individuals such as \( I_4 \) because this language has a blind spot there.

6 Conclusion

To conclude, a language such as English can be understood as a normative system (i.e. a social phenomenon) which enables us to communicate. In every moment of time (and possible world) it is possible to isolate a list of expressions and meanings associated with them, i.e. a function from expressions to meanings. This is a model of language in a synchronic sense; languages in a synchronic sense can be viewed as entities warranted or produced by language as a normative system. (I have exposed several reasons why numerical codes provide the best model of language in a synchronic sense.)

A model of language in a diachronic sense is an ‘extrapolation’ of the modelled language in a synchronic sense on a time scale and in modal space. Languages in a synchronic sense are thus functional values assigned to worlds and times.

A model of language in both a synchronic and a diachronic sense is thus an abstraction and also an idealization of the phenomenon of language. As such, the model is still useful because it enables us to sufficiently model especially semantic phenomena.

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\(^{19}\)Extensions are modelled as (possibly partial) characteristic functions.
References


