How Are Language Changes Possible?

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This paper is concerned with an issue in the ontology of language. The question we wish to ask is this, namely, given that a language consists of linguistic types which are abstract objects, and that abstract objects do not exist in time, how is it possible for a language to change?

We start with drawing a distinction between linguistic types and tokens (§1). Then, in §2 it will be argued that linguistic types are contingent abstract objects. After trying to locate linguistic types among various type entities in §3, we note that the ontological status of linguistic types has an important epistemological consequence that we have a posteriori knowledge of abstract objects such as linguistic types, because we come to know their properties by encountering their tokens in our experience (§4). If a language is a system of abstract objects, then it does not exist in time, and hence, it cannot change. But, we talk of a language as if it is constantly changing. How can such contradictory claims be reconciled? This is the main question of this paper and the business of §5 is to try to answer it. In answering it, we propose to make two corrections to our way of talking about language. First, "language change" is, in reality, a replacement of one language by another. Strictly speaking, languages cannot change; only linguistic practices change. Second, language names such as "Japanese," "French," or even "first-order language" are not singular names but common names. We should admit there are a great number of different languages which are all called "Japanese."

1 Types and Tokens of Linguistic Expressions

How do we proceed to specify a language in an explicit way? First, we should specify a vocabulary, a set of words that form the fundamental elements of the language. In many cases, words are classified into several classes, which are called categories according to the role they play in sentences. A vocabulary must be a finite set. Otherwise, we could not decide whether a given expression belongs to a given language or not [1]. After having specified a vocabulary, we

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[1]Is it really necessary that we should be able to determine whether a given expression belongs to our language or not? Is it not conceivable that a language we use has an infinite vocaburaly and at any time we know only a part of our language? If such a state of affairs is possible, then we might have a straightfoward route to our claim in this section, that is, that we should admit the existence of abstract linguistic objects like types as well as concrete linguistic objects like tokens. For, supposedly, under the current cosmological assumption,

should state the rules for forming complex expressions from the words in the vocabulary. We form a phrase by combining words, and a sentence by combining phrases. Let us call a word a simple expression, and a phrase or sentence a complex expression [2].

If a recursion can be repeated without restrictions in a language, it is possible to form an infinite number of complex expressions, and hence, an infinite number of sentences. Of course, it is impossible that the whole infinite variety of these sentences is actually produced; on the contrary, it is certain that there are sentences that will never be pronounced or written. Even though each sentence is finite in length, its length can be arbitrarily large if the language allows unrestricted recursion. Thus, if the current assumption that our universe is finite in both space and time is correct, it happens that we don't have time or space enough to present certain very long sentences. It is not difficult to imagine such sentences. Just take a simple rule for forming logical conjunctions in a language for propositional logic, and apply it many times over to just one propositional letter, say, P.

Even in a language where only a finite number of sentences are possible, there may be many complex expressions that are permitted by grammar and yet never encountered in reality. Suppose that Japanese were a finite language where recursion is not unrestricted. If this were true, the language would still be complex enough to contain many grammatically correct expressions that have never been used, and will never be used in the future. Moreover, there may be Japanese sentences that happen never to be used by anybody, simply owing to pure chance.

Thus, in any language, many of the sentences that are judged to be grammatically correct will be never used, and hence, never produced in any way whatsoever. It seems only natural to say that these "unrealized" sentences have only a possible existence (rather than a real one). One role of the grammar of a language is to give the totality of the possible sentences in the language. As even such huge sentences that cannot be contained in our universe are among the "possible" sentences, the possibility we are concerned with here should not be physical possibility, but one much more akin to logical possibility.

To hold that an unrealized sentence has only possible existence is to think that existence for a sentence is the same as existence in space and time, and hence, that a sentence is a spatiotemporal object. If we make the distinction between possible existence and actual existence for sentences, we must hold that the actual existence of a sentence is nothing but its being produced in a particular time and place.

In general, our way of talking about sentences or linguistic expressions sug-

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it is impossible for our universe to contain a token for every word of this infinite language, provided that each token is at least recognizable to us; hence, we admit the existence of linguistic types which have no tokens.

[2] In a natural language, a word is represented by a combination of sounds, letters, or gestures, whereas a word is represented by a simple symbol in many artificial languages made for the purpose. But, the fact that a word has a complex representation in a natural language is irrelevant to the following discussion.

gests that we are not treating them as spatiotemporal entities. This can be observed from the way we use the phrase "the same sentence". Please look at the following example:

> We had a terribly hot summer this year.
> We had a terribly hot summer this year.

What are we going to say about this? Here we have two sentences that are the same. But how can we say that? If there are two things of the same kind, they should be different from each other, and it is therefore impossible that they are the same. Is it not a contradiction to say that here are two dogs which are the same dog?

The key to solving this puzzle is in the fact that the word "sentence" can be used in two different ways. As is frequently the case, the apparent contradiction we have here is caused by ambiguity. When we say that we have two sentences, "sentence" refers to some spatiotemporal entity, whereas the word "sentence" in the phrase "which are the same sentence" could not refer to a spatiotemporal entity. In the latter case, a sentence is construed as something which does not exist in space and time, and is called "a sentence as a type". In the former case, a sentence is construed as something that exists in space and time, and is called "a sentence as a token". It is not difficult to see that a similar distinction applies to linguistic expressions in general [3].

A sentence as a token is a concrete entity that is located in a particular time and place. It can be an event consisting of a series of sounds or gestures, or a material object like the stains of ink on a paper. Although an expression as a token is an entity which is bound to one particular time and place, we regard a linguistic expression as something that can be used repeatedly in different times and places, just like a tool. Here, we are thinking of expressions as types.

When we scold our child for her bad writing, or complain to someone else of not catching what she said, we are concerned with tokens. However, most of the time when we are talking about a language, we are concerned with types. If someone says that he missed the name mentioned, and goes on to ask what the name the other person mentioned was, it is obvious that what he wants is not a name as a token but a name as a type.

If you wish to know what sort of things constitute a given kind, you can do so by examining the conditions under which these things can be identical. Our considerations on what we understand by "same sentence" or "same expression" show that we regard sentences, or linguistic expressions in general, as types that are not located in space and time. As types can be counted and named, they should be regarded as objects. Let us call those objects which exist in space and time concrete objects, and those which do not exist in space and time abstract objects. Therefore, types are abstract objects.

[3] It should be obvious there is also a distinction between type and token for sounds, letters, and gestures that constitute (representations) of words.

2 The Ontology of Linguistic Types

Standard examples of abstract objects in philosophy are mathematical objects, such as numbers and sets. These objects exist necessarily if they exist; they are not contingent beings. Is this also true of linguistic types? That is, do they exist necessarily if they exist? The answer to this question wholly depends on what the existence of a linguistic type consists in.

At least for a simple type like a word, it seems correct to say that the existence of its type amounts to the same as the existence of its tokens. It does not make sense to insist that a word has existence as a type, in spite of the non-existence of its tokens. Among the possible combinations of Japanese syllables, some are already realized as Japanese words, and some are not. Those that do not constitute actual words in Japanese must be regarded only as possible word types, and hence, have no existence.

As a token is a concrete entity, its existence is always a contingent matter. Therefore, a simple type like a word, whose existence depends on the existence of its tokens, is a contingent abstract object. Although you might find this conclusion very strange, it is not so strange as it seems on the surface. Take any word in Japanese. It is entirely contingent that it belongs to the current vocabulary of the language. The matter is more obvious for a type entity other than linguistic expressions; there is no doubt that a film such as *Tokyo Story* or the symphony known as *Jupiter* came to exist only contingently.

As a type does not exist in time (unlike a token), it would be senseless to say that a type begins to exist at a certain time or ceases to exist at a certain time. Nevertheless, we tend to think that a word ceases to exist as a type if nobody will use it. Similarly, we tend to think that the film *Tokyo Story* itself will no longer exist when all the prints, DVDs, scenarios, etc. are lost.

Though it seems natural to think in this way, the "naturalness" of this way of thinking derives from the fact that our conception of existence is heavily biased towards existence in time. Compared to tensed existential predicates like "existed", "exists" and "will exist", an untensed existential predicate always sounds unnatural. In particular, we are inclined to think that the existential predicates which are appropriate for a type entity are tensed ones, because the existence of a type entity depends on the existence of tokens (which are spatiotemporal entities). However, as a type entity is not in space or time, a tensed predicate cannot apply to it.

What might be helpful for us is a distinction between real and unreal: This distinction applies to both temporal existents and non-temporal existents. Thus, we can use the predicate "is real" as an untensed existential predicate. As tokens are temporal entities, for them to be real means the same as one of the tensed existential predicates applying to them. For types, which are not temporal entities, their reality cannot be the same as the applicability of such tensed existential predicates.

In what circumstances is a word or a film as a type a real word or film? It is real when there are corresponding tokens; that is, when a tensed existential predicate applies to them. If such a token is going to exist in the future, we may

not always know with certainty that a type in question is real. Such a limitation in our knowledge is only an epistemological problem, which is independent of ontological concerns. What is obvious is that a type is real insofar as there are some past tokens or future tokens, even if there are no tokens of it at present. Even though every token of *Tokyo Story* is lost, this fact does not make *Tokyo Story* an unreal film; similarly, even though one of our words now in use shall disappear completely in the future, and thus the future generations will have no clue as to its existence, the word will not become an unreal word.

I hope our conclusion that a simple type such as a word is a contingent abstract object has now become less strange, by the considerations we have offered here. The next thing we should consider is what constitutes the existence of a complex type, such as a phrase or a sentence.

The most straightforward answer to this question is that the existence of a complex type is embodied in the existence of its tokens, just as in the case of a simple type. According to this answer, a grammatically correct phrase or sentence that is never to be produced in the entire history of the universe does not exist. Though this seems to be a perfectly reasonable conclusion, there is one problem here.

Let us remember that a word is a contingent being. Hence, there are possible words that are not in fact real. It is easy to imagine a possible word which might have been an English word but never becomes one. For example, the expression "agor" is a possible combination of English syllables but it is not an English word. Let us suppose that this combination of syllables never becomes an English word in the future, either. Still this expression might be a word in English, say, an adjective. Thus, this expression is a type entity which exists only in possibility. Moreover, we can form a possible phrase or a sentence like "an agor student" or "She is very agor", using this possible word. If you compare these possible expressions with those grammatically correct expressions which happen to have no tokens, you might have the impression that the latter kind of expressions are "much more real" than the former. There is a reason for such an impression: The possibility of the latter kind of expressions is already contained in an actual language, whereas the possibility of the former kind is not.

One way to be faithful to such an impression is to hold that a complex type such as a phrase or a sentence exists not only possibly but actually, if the grammar of the language allows its formation. More formally, this can be stated thus:

> A complex type α exists if and only if all simple types which are components of α exist.

Here it is assumed that the term "simple type" covers not only words but also basic operations, like concatenating words. For such an operation its existence is the same as the existence of its tokens. As the necessary and sufficient condition for the existence of a simple type is the existence of its tokens, the following is true.

A complex type α exists if and only if all simple types which are components of α have their tokens.

Our claim that a complex type like a phrase or a sentence has existence in spite of the nonexistence of its tokens agrees with our way of speaking when we wish to state something general about linguistic matters. Consider one such generalization: In Japanese a new noun phrase can be formed from two noun phrases by using the particle "no". There are two things worth noting in the way this generalization is stated. Firstly, no one thinks that this generalization applies only to those noun phrases which happen to have tokens. Secondly, no one thinks that this generalization applies even to those possible noun phrases that contain words that are not part of actual Japanese. In other words, the quantificational domain for such a generalization over types consists of all of the expressions which can be formed from the actual words, and it does not matter whether these expressions have their tokens or not. In the light of the close tie between existence and being in the domain of quantification, this means that the existence of tokens is not required for a complex type to exist.

In sum, there are three ways for a linguistic type to exist.

(a) A linguistic type exists as a type with a token.
(b) It exists as a type without any token.
(c) It exists only possibly as a possible type.

A simple type like a word always belongs to the category (a). A complex type such as a phrase or a sentence belongs to either (a) or (b). To the category (c) belongs a word that is not actual or a complex expression which contains such a word. As we argued above, the category (a) consists of contingent abstract objects. The same can be said of the category (b), because the existence of a complex type depends on the existence of simple types, which in turn depends on the existence of their tokens. Lastly, the category (c) consists of the contingent abstract objects that happen not to exist.

3 The Variety of Type Entities

The distinction between type and token is applicable not only to linguistic expressions but also to a variety of things we encounter in everyday life. It is easy to recognize that there is a type-token distinction in the commodities we consume or use. For example, there is ambiguity in saying "She and I drive the same car." It might mean either that she and I are the joint owners of a single car and use it in turn, or that she and I own and drive cars of the same make. In the former interpretation we are concerned with token, and in the latter we are concerned with type. If we consider sentences like "They wear the same clothes" and "The two men ordered the same dish," it is much more difficult to interpret them as being concerned with tokens. In the consumer society we now live in, we are surrounded by a vast number of the mass-produced commodities which have a certain specified design and function in common. Each design

determines a type, and an individual commodity which is produced after the design and sent to the market is the token.

A type-token distinction is also applicable to natural kinds and individual entities belonging to the kind. In the sentence "The Siberian tiger is now facing extinction," "Siberian tiger" refers to a type, whereas the same expression refers to a token in a sentence "A Siberian tiger is in the next cage." The entities that belong to the same natural kind are produced (or reproduced) in such a way that they have certan traits in common. Further, we find that these individual entities and the kind are called by the same name [4].

It has been frequently noted that the type-token distinction plays an important role in various genres of art. We all know that songs sung by different singers on very different occasions are still the same songs, and that novels published in different formats, even in different languages, are still the same novels. When we talk about a musical composition, not the performance itself, or when we talk about a certain famous novel, not a copy that I bought at my local bookstore, we talk about type entities.

In general, there are three kinds of cases in which the type-token distinction is applicable. First, there are cases such as commodities and natural kinds in which numerous individuals are produced or reproduced according to the same specification. Second, there are cases such as tonal systems and languages, which are systematic in character and consist of elements that differ in complexity. Finally, there are cases such as musical compositions and novels whose existence depends on the systems that figure in the second sort of case.

Although musical compositions and novels are works of art to which the type-token distinction applies, it should be noted there are works of art to which it does not apply. It is not appliable to paintings and sculptures. In such genres, the original is absolutely unique, and even the most perfect copy is still only a copy. Even if two paintings or sculptures are so similar that nobody can distinguish them from each other, what we have are two different paintings or sculptures.

Among works of art to which the type-token distinction is applicable, there are those which are similar to commodities in the sense that they are produced after a previously specified design. The obvious examples are woodcuts and lithographs; photographs are another example. We may also include films in this class. Here we should note the fact that a film has to be screened for watching. This fact leads us to two different views as to what should be regarded as a token of a film. According to one view, only a screened film is the token of the film; a token of *Tokyo Story* is nothing but a particular event which is its screening, and there are as many tokens of *Tokyo Story* as there are screenings

[4]The fact hat a type-token distinction applies to both commodities and natural kinds suggests that there might be many similarities between natural kind names and names given to commercial commodities (brand names). Just as a natural kind name is introduced into our language as signifying a natural kind as type, a brand name is introduced into our language as signifying a commodity type. Hence, there is a good reason to think that brand names have most of the semantic properties which were ascribed to natural kind names by Putnam and Kripke in the 1970's.

of the same film. On the other hand, according to the other view, a token of *Tokyo Story* is not necessarily its screening. It can also be some physical object like a set of reels of the film, a videotape, or a disk. If we adopt this second view, there are two different categories of things among the tokens of *Tokyo Story*, namely, events like the screenings of the film and physical objects like tapes and disks.

Let us return to the case of musical compositions and novels. A musical composition usually depends on some system of tonal sounds, which is comparable to a language. In this respect, a musical composition resembles a literary work like a poem or a novel. Just as the existence of a particular token of *The Tale of Genji* depends on the existence of a series of tokens of Japanese words, the existence of a particular token of *Chromatic Fantasy and Fugue* depends on the fact that a number of the token sounds that belong to the tone system characteristic of modern Western music are distributed appropriately in time [5]. All this shows that a literay work and a musical composition are type entities which presuppose the existence of systems of another sort of type entity such as a language or a tonal system, whose elements are the material from which the literay or musical work is made.

From the fact that some kind of type entities are dependent on more basic entities, it does not follow that the former are reducible to the latter. For example, nobody would think that a literary work could be completely explained by the intrinsic properties of the language in which it was written. Thus, nobody would think that all that can be said about *The Tale of Genji* is derivable from facts about the vocabulary and grammar of the Japanese language of the time it was written. But, at the same time, in order to see how a particular work of literature or music is organized, we should know beforehand the system of types upon which the existence of these works depends. This means that we can safely leave the examination of type entities like literary works and musical compositions until later in our ontological investigation of type entities. Then we are left with only two kinds of type entities, those represented by commercial commodities and natural kinds, and those represented by languages and tonal systems.

When we compare these two kinds of type entities, we will find that there is a noticeable difference in how indispensable they are to our overall ontology. This is suggested by the fact that we can identify an object which is a token of some commodity without knowing the type it is a token of. I don't know the make of the car which is always parked at the end of my street. But I know that it is a car, and I can even judge whether the car I see now is the same one I saw yesterday [6].

[5] Just as a token of a film might be an event or a physical object, a token of a poem or a musical composition might be an event or a physical object. In one extreme view, only a recited poem is a token of a poem and only a performed composition is a token of a musical composition. But, in the other view which is not so extreme, a token of a poem or a composition might also be a physical object like a book, a printed score, or, a CD.

[6] The same applies to natural kinds. I don't need to know the exact species of the birds which visit my garden in order to see whether I see the same birds every morning.

The matter is much different with linguistic tokens. Let us consider the simplest case, that of letters of the alphabet. Suppose we travel to a country whose letters we have no knowledge of. It will not be difficult to have some idea about the shapes of their letters, if we can recognize a signboard, a book, or a newspaper there. But however often we encounter such letter tokens, we will not know how many letter tokens there are in a supposed series of letters, or where one letter token begins and ends, if we are not taught the letters of the language as types. We can recognize a letter in a variety of fonts or styles only because we have an idea of that letter as type.

A letter as type is an abstract object which does not have a spatial or temporal location, in contrast to a letter token which is a concrete object that exists at a particular time and place. Given this, it sounds paradoxical to say that knowledge of a letter as type is necessary for the recognition of a letter as token. It cannot be true that we already know the letters of the language of the country we have never visited before unless we studied the language in school. Because in our experience we encounter only concrete things and events, our encounters with letters are nothing but encounters with letter tokens. As we have only tokens, how do we come to know letter types, which are abstract. The matter is still more serious. If knowledge of the letter type is necessary for recognition of a particular token as a letter token, how is it possible for us to have knowledge of a letter token in the first place?

What applies to letters applies to linguistic expressions in general. On one hand, when all we have are only concrete tokens, how can we come to know about abstract types? On the other hand, if we can know a token only through the knowledge of a type, how can we know a token in the first place?

4 The Epistemology of Linguistic Types

Although a type is given to us only through its tokens, we cannot recognize each token as such without an idea of a relevant type. This is the dilemma we are facing. Let us label its horns as (i) and (ii). Thus, the two horns of the dilemma are

(i) a type is given to us only through its tokens, and

(ii) we cannot recognize a token as such without an idea of its type.

This dilemma arises also for an infant who has no language and is going to acquire one, as well as for a linguist who tries to learn a language unknown to her.

If asked how a type becomes known through its token, we might be tempted to reply in the following way: first, the tokens which resemble each other are collected into one group, and then a type is abstracted as a common characteristic of those tokens in the group. But obviously such a story is not plausible, if we admit the validity of (ii) which says that there cannot be a token recognition without an idea of its type. To convince ourselves that it is utterly impossible to get a type by abstraction from the tokens which resemble each other, it is

sufficient to note the fact that a wide variety of designs can represent the same letter. It is no exaggeration to say that only characteristic which is shared by all the tokens of the letter "A" is being a token of the letter type"A."

But then, according to the other horn of the dilemma, namely (i), it seems impossible to have the idea of the letter type "A" in the first place. A person who has never seen any token of "A" cannot have an idea of the type "A." It is absurd to claim that the type "A" is known a priori, even if it might not be absurd to claim that mathematical objects like numbers are known a priori. Then it seems that we should conclude that we come to have knowledge about types, which are abstract objects, in an a posteriori way through the experince of encountering its tokens. This conclusion, however, embodies the seemingly absurd idea that we have empirical knowledge about abstract objects [7]. Moreover, we are still far from escaping from horn (ii) of the dilemma according to which encountering a token presupposes the knowledge of its type.

It might be helpful to consider how perception of a material object is possible. Strictly speaking, the only information about a material object that is given to us through our senses is about its surface at a particular instant. This is true not only of vision, but also of touch, which has the same importance as vision in the perception of a material object; what is given in touch at each instant is concerned with only a part of the object, and not the whole, and in that sense what is touched at a particular instant is only a "surface" and not the whole object. Although a material object is more than the totality of the sense perceptions of its surface, there can be no doubt that we succeed in perceiving a material object which endures in time and extends in three dimensional space. Still it is true that no perception of an object is possible without perception of its surface.

But can we have a perception of the surface of an object without having an idea of a material object? In the first half of the 20th century, several attempts were made to explain how we construct the idea of a material object from a class of surface perceptions which resemble each other. Bertrand Russell's *Our Knowledge of the External World* (1914) is an early example, a much later one is Nelson Goodman's *The Structure of Appearance* (1951), and in between we have Rudolf Carnap's *Die logische Aufbau der Welt* (1928). The present consensus about the feasibility of such attempts seems to be negative. Therefore, it is impossible to get the idea of a material object from only surface perceptions, although the latter are indispensable to the former.

Thus, we have a dilemma similar to the one about linguistic types and tokens. Whereas

[7] IN his paper "Types and tokens in linguistics" S.Bromberger pointed out that it is philosophically problematic that knowledge of type can be had only through tokens (A.George (ed.), *Reflections on Chomsky*, 1989, Blackwell, pp.58–89). But it must be remembered that the same point had been already made by C.Parsons in his paper "Mathematical intuition" (*Proceedings of the Aristotelian Society* 80 (1980) 145–168). In particular, note the following passage: "The *problem* about the timelessness of types is really epistemological: how can we know truths about types by a certain kind of perception of tokens, which are then valid for *any* tokens of the type involved" (p.160; emphasis is by Parsons).

(i) a material object is given only through perception of its surface,

we have to hold that

(ii) we cannot have any perception of a surface without an idea of a material object.

To begin with, as a matter of fact, when we perceive a material object, we are not conscious that what is given immediately to us is only its "surface." We regard ourselves to be perceiving a three-dimensional body which endures in time. Surface perceptions of material objects are always accompanied by thoughts about currently unperceived parts of the objects. It is rather difficult to have a "pure" surface perception, because our surface perceptions are almost always "impure" in the sense that they are accompanied by ideas of enduring three-dimensional objects [8].

We would like to suggest that something similar holds also in the perception of linguistic expression. When we see or hear words, we are not aware that what is given to us are tokens, which are physical events or objects. We regard ourselves to be seeing or hearing types, which can be written or said again at different times and places. This may be supported by the fact that it requires conscious effort on our part to become aware of the mere physical sound or design of a word, instead of phonemes or letters. We also know that if we say or write the same word again and again, it loses its linguistic "shape" and is felt to be a mere sound or design. As the word's "shape" is sustained by the idea of type, the word ceases to be a linguistic entity when the idea of type drops out.

We should conclude that when we perceive a linguistic expression we perceive a type rather than a token, just as when we perceive a material object we perceive a three-dimensional object enduring in time rather than a surface. Just as the perception of material objects involves the understanding that its objects are three-dimensional and endure in time, the perception of linguistic expressions involves the understanding that its objects are type entities which can have various instances at different times and places.

Now do these considerations help us to solve our dilemma? First let us take up the question of how we come to know about types, which are abstract objects, when all we have are tokens, which are concrete objects.

The most straightforward answer is that we perceive abstract objects themselves when we perceive linguistic expressions. Just as we perceive material objects themselves rather than their surfaces when we perceive our environment, we perceive abstract types rather than concrete tokens, which are physical events or objects, when we perceive linguistic expressions. However, we should note that these abstract objects depend on their concrete tokens in an essential way: every perception of a type depends on some token object which exists at the time or on some auditory or visual event caused by the token object. In general, a linguistic type is a contingent being because its existence depends on that of its tokens. The claim that linguistic types are abstract objects which

[8] We owe these points to Shozo Ohmori. Among many writings of his, see, for example, *Mono to Kokoro* (Thing and Mind, 1976, Tokyo: The Tokyo University Press).

exist contingently has an epistemological correlate in the claim that we have a posteriori and empirical knowledge about abstract objects when we know facts about linguistic types.

But then, if we perceive a type when we hear or see a token, how is it possible for us to learn a new expression? It is not only that. How is it possible for us to acquire a language at all? For though a type is given to us only through its tokens, according to the present view we can recognize a token only when we already know its type. What we are now facing is nothing but horn (ii) of our dilemma.

Here again, it helps to remember how the matter stands with the perception of a material object. As we noticed before, there is a similar dilemma here. Though only the spatial and temporal surface of the object is immedeately given to us , we perceive the object enduring in time with its three dimensions. On the other hand, we can perceive the surface of an object as a surface only if we have an idea of a material object. Thus, though a material object is given to us only through its surface, it seems that we can recognize a surface only when we already have the idea of a material object.

We perceive a material object when we succeed in organizing various surface perceptions into the perception of one particular material object. In order to be able to do this, we need the idea of a material object in general as well as a way to determine a particular material object whose surface perceptions we have.

The same thing applies to the case of linguistic expressions. We need the idea of a linguistic type in general as well as a way to determine a particular type whose instance we have at hand. Just as the perception of a material object has the form "here is a material object, one of whose surfaces this is," the perception of a linguistic type has the form "here is a type, one of whose tokens this is." In both cases, what we need is both an idea of a material object's having a surface or a type's having a token as its instance and a way of recognizing a particular material object or a particular linguistic type.

First, let us consider how we come to the idea of a material object in general, or how we come to the idea of a linguistic type in general. For the case of the idea of a material object, there seem to be at least three ways to answer this question.

(a) We come to the idea of a material object by induction from our experiences of its surfaces.

(b) Material objects are theoretical entities that are postulated by us.

(c) The idea of a material object constitutes a part of our basic conception of the world.

In the case of a linguistic expression, we have the same three options.

(a) We come to the idea of a type by induction from our experiences of its tokens.

(b) Types are theoretical entities that are postulated by us.

(c) The idea of a type constitutes a part of our basic conception of the world.

Let us examine each of these three options in turn.

We have already argued against (a). Just as we cannot determine whether or not two surfaces belong to the same body, if we know only the perceptible properties of surfaces and their relations to each other, we cannot determine whether or not two tokens are instances of the same type, if we know only the perceptible properties of tokens and their relations to each other. Thus, however great the amount of perception we might have of surfaces or tokens, we cannot get the idea of a material object or a type from these perceptions alone.

Compared to (a), (b) might be thought to be a more reasonable position. Let us take the concept of a word. In a given language, what constitutes a word depends to a large extent on theoretical considerations, because the identity of a word is closely connected with the question of how a string of expressions should be articulated, and different theories provide different answers. The same applies to the concept of a sentence. It is not too much exaggeration to say that what constitues a sentence differs according to different grammatical theories. Such a consideration seems to lead us to the conclusion that linguistic types like words and sentences are theoretical entities postulated by a grammatical theory.

No doubt there are the concepts of words and sentences which depend on grammatical theories. Does this imply that linguistic types in general are theoretical entities? If it does, we would have a strong reason to doubt the claim we made before, namely, that we perceive a type when we perceive a linguistic expression. For, whatever conception we might have of theoretical entities, it would be true that they cannot be the objects of our perceptions, and hence, if a linguistic type were a theoretical entity, it could not be the object of our perception.

Here again, let us go back to the case of the perception of a material object. The reason why we hesitate to regard material objects as theoretical entities is that, if we did, we would have to conclude that what we perceive are not material objects. However, there is no contradiction in thinking both that material objects are not theoretical entities and that we should appeal to a theory in order to get a more detailed conception of material objects. Our perception of material objects is always an articulated perception of a scene consisting of a number of objects. When we wish to answer in a systematic way the questions like where one object begins and ends, or how many objects there are in a perceived scene, we need a theory.

We claim that the same consideration applies to the perception of linguistic expressions. When we hear or see words, our perceptions of them are always articulated. Just as there are no perceptions of physical scenes without any articulation into various material objects, there are no perceptions of linguistic expressions without articulating into words or phrases. But reflections on how we accomplisch such articulations, what sorts of principles are used in them, and the like, do not belong to perceptual activity itself, but are a part of theo-

retical considerations about it. There is no contradiction between the fact that grammatical categories like word and sentence can be characterized only by theoretical considerations and the claim that linguistic types are not theoretical entities and can be the objects of perception.

Thus, our considerations so far present alternative (c) as the most promising way to explain the origin of the idea of type in general. We should hold that the idea of type, in particular that of linguistic type, is as fundamental to our conception of the world as the idea of material object. According to our idea of type, a type has various tokens as its instances, just as a material body presents to us various appearances which differ with its position relative to us, and in the perception of type, tokens play the part which perspectives play in the perception of material objects.

Next, we have to consider how we can identify a particular linguistic type when we have only various perceptions of sounds or shapes and the idea of a linguisitic type in general. The corresponding problem in the case of the perception of a material object is to explain how we can get hold of a particular material object when we have only various surface perceptions which are not necessarily of the same object, though we have the idea of a material object in general. In both cases, we have to take into account an important fact that perceptions are not passive states, but activities we engage in.

In the case of the perceptions of material objects, what we are directly confronted with is the totality of the surface perceptions of various material objects. As we have the idea of a material object in general, we know that these surface perceptions are the perceptions of the surfaces of material objects. But we don't know yet how these perceptions should be articulated in such way that the perceptions of the surfaces of the same material object are classified as such. This we accomplish by exploring our environment using our own bodies. We might change the directions of our gaze, walk around in order to look at what was not in sight before, put our fingers on the surface of a body and move them along it, and so on. We produce ourselves new surface perceptions in moving our bodies or body parts intentionally, and try to integrate them as the perception of a material object.

It should be still more obvious that our perceptions of linguistic types are not possible without our actions. If we cannot even try to produce linguistic tokens ourselves, we cannot expect to recognize types. We try to produce a token with an intention of producing a token of the relevant type.

Consider what we do when we start learning some new language with an instructor. She gives us a sequence of sounds as a token of a word in the language. We try to produce another sequence of sounds which we hope to be similar to that given by the instructor, because we intend to produce another token of the same word. What we aim in our efforts is not reproducing a sequence of sounds which resembles the sequence given to us as closely as possible, but producing the one which we hope to be recognized as another token of the same word. If the sounds we produced are not recognized as a token of the intended type, then we make another trial with some changes and hope the result will be recognized as a token of the type as we intend. It is clear that the concept of type

is essentially involved in our intention to produce the sounds we do.

The matter is more or less the same when we learn a new language without an instructor. But, it does not mean that we can learn a language by ourselves. We need the interactions with the people who already speak the language to get recognition or correction of our performance. The fact that such inputs from the others are necessary for our learning a language shows in turn the necessity of our actions aiming at the others [9].

5 The Identity of a Language and the Fact of Language Changes

I have been arguing that a language is a system consisting of type entities, both simple and complex. Among simple types, there are those that operate on other types and return new types, and others that are operated on. Take some language, L. If we designate the totality of the types of the former kind in L by C, and the totality of the types of the latter kind in L by V, then the totality of the complex types of L can be designated as $C(V)$. But there is more to a language. A language is not only a syntactic structure, but also a semantic system. So, let us consider a relation M, which relates each element of $C(V)$ to its meanings. As some elements of $C(V)$ may not have meaning by themselves, M need not relate meanings to every element of $C(V)$. M is not a (partial) function but a relation, because some elements of $C(V)$ may have more than two meanings. There may be two different meaning relations, M and M', for the same $C(V)$; in such a case, we have two different languages. Thus, a language L can be represented as a pair of a system of types $C(V)$ and a meaning relation M.

$$L = \langle C(V), M \rangle$$

This characterization of a language is very crude. In particular, it is certainly unrealistic that the semantic aspect of a language could be adequately represented by the meaning relation M. However, apart from such defects, there seems to be a fundamental difficulty in characterizing a language in this way. The difficulty is caused by the fact that both of the elements which constitute the language are abstract objects. Abstract objects do not exist in time. Therefore, it is meaningless to talk about their changes. Obviously, this conflicts with our belief that a language changes and does so constantly.

You might say that our way of characterizing a language is appropriate for only artificial languages, such as the languages of logic, and is not suitable to natural languages like Japanese and English. However, there is no difference in ontological status between an artificial language and a natural language. Both of them consist of words and sentences, which are type entities. As type entities

[9] Much more should be said about this topic. In particular, there exists a large amount of relevant work done in the fields of the pscychology of perception and natural language processing.

are abstract entities, it should follow that a language is also an abstract entity. As an abstract entity, a language must be incapable of change. How can we talk about the various changes in English or Japanese without any hint of conflict or difficulty?

We have come to such an impasse because our present way of talking about a language is misleading, in two respects. Firstly, what is called a change in a language is not a change in the language itself, which is impossible, but a replacement of one language by another that is similar to it. Secondly, the name of a natural language like "Japanese" or "English" is not a singular name that designates a single language, but a common name that applies to a number of different languages. If these two points are fully appreciated, it will be obvious that there is no conflict between the abstractness of a language and the reality of linguistic changes.

Linguistic changes are comparable to changes in the color of an object. When we say the color of an apple has changed from green to red, we do not mean that the color green itself has undergone a change and turned into red, but that the apple has come to have a different color. Just in the same way, when we say a language has changed, what we mean is that people has come to use a language which is a little different from the one they used to speak.

There are two sorts of color changes. In one case, an object comes to have an entirely different color from the one which it used to have, as when an apple turns from green to red. In another case, the change is slight, and both the former and the present colors are called by the same name, as when the color of an apple turns from light red to dark red. Just in the same way, there are two sorts of changes concerning languages. One sort comprises the cases in which people switch from one language to another; in such cases, people come to speak an entirely different language from the one they used to speak. This sort of change used to happen in modern era as a result of colonialist policy. In contrast to such drastic changes in the language in use, there are another sort of changes which are not so drastic. In fact, such changes are very common and constantly happening all around us. When a new word enters into a person's vocaburary, she comes to speak a language which is not the same from the one she used to speak, although she is still speaking "the same" language in another sense of "the same." If we designate her new language by "L_1" and old one by "L_2," then what I am saying is that, although L_1 and L_2 are not identical because they have different vocabularies, both of them belong to the one and same language such as Japanese or French.

This means that a language name like "Japanese" or "French" is not a singular name which denotes a particular object, but a common name applicable to a plurality of objects [10]. When a language is characterized as a system of type entities with some meaning relation, it is inevitable what is currently regarded as a language name turns out to be a general term applicable to a great number of different languages. This is not only true of the names of natural languages

[10]It is impossible to hold that "Japanese" is a singular name which denotes a type entity whose tokens are various languages. For, in any type/token distinction a token must be a concrete object, and any language is an abstract object as we have argued here.

like "Japanese" and "French", but also the names of artificial languages like "Esperanto" and "first-order language." It is nice that "first-order language" is a common name as it is. Each different formulation of first-order language gives rise to a different language which belongs to a class of languages called "first-order language." [11] Earlier I compared a language change to a color change of an object. However, a more fit analogy is the changes in car models. Carolla is a car model manufactured by Toyota. On the surface, the name "Carolla" seems to be a singular term which denotes a single type entity. However, the car model called "Carolla" has changed many times since it first appeared many years ago, and there existed different models like Carolla E90 and Carolla E100. These names of the variants of Carolla do not designate individual cars, but some car types. Hence, we must conclude that the name "Carolla" is not a singular name of a particular type entity, but a common name applicable to several types relating to each other. And, when we mention the changes of Carolla, we are talking about the fact that, during a certain period, there appeared one after another various tokens of the different car types which all belong to the same kind Carolla. Similarly, a geographical "change" of Carolla can be explained by the fact that there are various models belonging to the Carolla family which are specially made for different local markets.

Various type entities which are called "Carolla" have to resemble each other in design and function which are characteristic to this brand. But such resemblences are not enough by themselves. For one thing, for a car model to be called "Carolla", it should come from a particular maker, namely, Toyota, or some company which is officially related to Toyota. Suppose some maker which has no official relation to Toyota, manufactures a car which resembles very closely to one of the models of the Carolla family; it will not be regarded as a "Carolla." What is lacking in this case is a right sort of causal connection with a car model which is recognized to be a Carolla. In other words, what is necessary for a car model to be a Carolla is not a mere resemblance in design and function, but such a resemblance with a right sort of causal connection.

Most of the things that are true of a car model are also true of a language. All the languages to which the name "Japanese" are applicable, resemble each other in their syntax and semantics; but, they have to resemble each other because of some causal connection between them. It is true that car models and languages cannnot enter into causal relations because they are not spatio-temporal entities. In the case of car models, what enter into causal relations are events like desigining and manufacturing. A new car model is a Carolla, because its design was done by taking the preceding Carolla models as the starting-point. Similary, in the case of languages, what enter into causal relations are not languages themselves, but the uses of a language. A language is called "Japanese," because it resembles the other languages which have been called "Japanese" and its uses are causally connected with those languages which are

[11] Different formulations of formal language like first-order language are usually thought to result in the notational variants of the same language, not different languages. However, it will be a difficult task to distinguish between a difference in notation and that in language in a principled way then.

recognizably Japanese.

I will give you two examples.

(1) When a person A has been raised in a society where Japanese is spoken, and has come to speak a language, her language is also a Japanese, because it resembles the languages spoken by A's elders and those languages are an essential part of the causes of A's use of her language.

(2) Usually a person uses a great many number of languages in her life time, but, in many cases, these languages are "the same" languages. If A uses a language L_1 at time t which is closely resembles the language L_2 which A has been using before t, then it is very likely that A's use of L_2 is causally responsible for A's use of L_1. Hence, L_1 is "the same" language as L_2.

Each time we acquire a word or start to use a new turn of phrase, we switch to a new language which is different from the one we have been using until then. But it is still the same "Japanese." A very drastic change, or an accumulation of changes over the long period of time may result in a language which is no longer considered to be Japanese. For, in such a case, the loss of resemblance is so great that it cannot be compensated for by a mere causal connection.

The boundary between what is Japanese and what is not Japanese is vague, just as the boundary between different colors are vague. There is nothing surprsing in this, because "Japanese" is a common name and it is a well-known fact that many common names have only vague extensions. The vagueness of the boundary between Japanese and non-Japanese does not mean that a language is a vague entity. Each single language is an abstract object and there is nothing vague about it. The reason why Japanese has only a vague profile is that it comprises an innumerable number of different languages.

Some puzzles are believed to exist relating to the concept of language identity. In particular, it has been claimed that the "identity" between languages is not transitive [12]. Suppose the "identity" between two languages consists in the fact that the speakers of the one can communicate easily and fluently with the speakers of the other. Then, there may exist three languages L_1, L_2 and L_3 with the following properties:

1. L_1 and L_2 are identical in the sense above,
2. L_2 and L_3 are identical in the same way,

but

3. L_1 and L_3 are not identical, because the speakers of L_1 cannot communicate with the speakers of L_3.

For example, suppose there are three areas A, B and C such that B lies between A and C, and there is no immediate contact between A and C. Suppose further that there have been daily exchanges between the people of A and those of B, and the same is true with B and C. In such a situation it might happen that

[12] Nobuharu Tanji, *Gengo to Ninshiki no Dainamizumu* (The Dynamism of Language and Knowledge), 1996, Tokyo: Keiso Shobo.

A's people and B's people can communicate with each other with no difficulty and the same is true with B's people and C's people, but A's people and C's people cannot commnucate with each other. In such a case, A's language is not identical with C's language, although the languages spoken in A and B are identical and those spoken in B and C are identical. In addition to such an example of geographical changes of language, we can easily think up a similar example of historical changes of language.

However, this argument rests on the confusion between the two different senses of "same." What is charactereized here as the identity between languages are not the numerical identity between individual languages, but the generic identity between them. Two languages are identical in a generic sense when they belong to the same kind of language and are called by the same name. If we interpret "identical" in the above argument as "identical in a generic sense," there will remain nothing puzzling about it, just as there is nothing puzzling with the existence of three color hues H_1, H_2 and H_3 with the following properties:

1. H_1 and H_2 are the same color, because they cannot be distinguished from each other,
2. H_2 and H_3 are the same color just as H_1 and H_2 are,
but
3. H_1 and H_3 are not the same color, because they can be distinguished from each other.

Thus, our view of language identity gives us a natural solution to such puzzles. They turn out to be yet another class of puzzles relating to vague concepts known as the sorites paradoxes. Moreover, it gives a natural explanation of the apparetly paradoxical fact that a language seems to admit temporal and geographical changes in spite of being an abstract object which does not exist in space and time.