

TEMPORALITY IN THE CONNECTIVES

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Abstract

In this paper I will try to analyse some neglected aspects of the connectives. This analysis shows also that the role of connectives with respect to physical things and in language is significantly deeper than one might expect. I will argue that the role of the connectives in every day language is to relate sentences to each other according to their temporal specifications. Secondly, I take into consideration that the different connectives set up different combinations between tense (and space) of the sentences, and each combination, as a whole, provides new information. If the connectives are taken as independent elements, we can speak of the modality of connectives in logic, and in daily language.

Key words: Connectives, togetherness, time, physical things

As is well known, the main role of sentential connectives in natural languages is to relate sentences to each other. In logic, they are treated as constants, and are defined by their characteristic truth tables. But the role of connectives both in language and logic is different than is usually accepted today. In this paper I will try to uncover some of their features, and then to define them from a different point of view.

What we know about the connectives in logic depends on their formal properties, and we do not see any specific difference between the different connectives from the logical point of view. However, the connectives of daily language might have very specific epistemic features, and indicate specific ontological features.

As usually accepted, the syntactical connectives are syncategorematic terms. But it seems possible to take them as terms indicating 'togetherness', 'dependence', and so on, and therefore they might have ontological significance.

‘Togetherness’, for instance, may indicate a physical situation. This situation tells us that there are things coordinated in a certain time and space, that is, things which are together according to their place and to time interval, or at a moment.

We can indicate or express this situation, as I will try to show, through the connective ‘and’. For this reason, we can say that the connectives together with sentences may indicate some specific physical situations. In other words, the connectives regulate and co-ordinate the tense of sentences, and so they reflect some specific physical situations.

The basic idea behind this thought is that we co-ordinate, image, and regulate things into different situations. These situations are expressible with concepts like ‘together’, ‘it depends on’, etc. There is a correlation between these concepts and the connectives. If this is correct, then the connectives are not merely syncategorematic terms, but have ontological and epistemological features.

The spectrum of usage of the connectives is very large and diverse, and so they might have various characteristics. Any explanation which would be given about them, of course, will not involve all their features. However, from my point of view we gain a new perspective.

We refer here to Wittgenstein's philosophy, and borrow his terminology in order to show the role of connectives describing physical things. According to his philosophy ‘the world is the totality of facts...’ (Tractatus, I, I), and ‘the world is determined by the facts, and by these being all the facts’ (Tractatus, I,II). Without calling into question the Philosophy of Wittgenstein, we can ask ‘what does he mean by all the facts, the totality of the facts, or the togetherness of the facts, with which the world is determined?’ Indeed, as Russell noted in his Introduction to Tractatus (P. 9): ‘Wittgenstein had defined a *Tatsache* as compounded facts which may consist of two or more facts like ‘Socrates is wise and Plato is his pupil.’ Clearly, the totality of facts can be expressed here by using a connective. In spite of his terminology, I hope, we can speak of different compounded facts, i.e., *die verschiedenen Tatsachen*, characterized by the connectives. In other words, different connectives determine different groups of facts, that is, totality of the facts. Totality of the different facts (i.e., *die Tatsachen*), which are characterized by the connectives are put into the existence of the world. Since, according to Wittgenstein (Tractatus 1.2) ‘The world divides into facts (*die Tatsachen*)’.

Consequently, every atomic sentence indicates a single fact. But we can indicate the compounded facts in terms of molecular sentence, which include connectives. It means also, we need different connectives in order to speak of

different compounded facts. In other words, different connectives combined with the sentences may indicate different compounded facts, that is, a group of facts. Now we can ask 'what characteristics might these facts have?' and 'what sort of relations are there between compounded facts and connectives?'

Let us demarcate our interest with some compounded facts (Tatsachen) which we perceive now. In this case we can divide the elements of compounded facts into two different groups. One would consist of a simple collectin of single material particulars, or the elements of it would be a case in which one depends upon the other.

In the first case, the main characteristics of compounded facts are simply to be together. We can describe this situation with a sentence like 'The pencil, and books, and a P.C., and etc. are on my table.' Of course, the elements of the books compounded facts might be in continuity as well. This fact could be expressed by a sentence like 'He is speaking and walking' Here again, what we perceive now is what we see together now. Clearly we need the connective 'and' in order to indicate both aspects of this compounded fact. This feature of 'and' will be true for compounded facts about the future and the past.

Second, compound facts would be in progress, in change, but the second element needed depends on the first. In order to describe this kind of group fact, of compounded facts, we use simply a cause-effect relation, that is, a relation with which we can indicate an action as dependent upon another. This relation could be expressed by sentential, non-sentential, or temporal connectives, like 'because of', 'before', 'after', 'since', 'until', 'for this reason', etc. For instance, a single fact in progress like 'opening the door' can be thought of as a compound fact in the manner 'The door is opening now because of my wife is coming'. It is clear that it also indicates a compound fact, or a group fact in a progress. This case could be expressed by molecular sentences which must have a connective, since, in order to indicate progress and also for a compounded fact we need a connective together with the sentences.

Let us take here the sentential connective 'if ... then' as a generalization for other connectives, whether they reflect a cause-effect relationship or a causal process. A causal process means here that physical things follow each other in which the second is dependent on the first in any way. It is unnecessary to say that the meaning of 'if... then' is really very broad because it may indicate an inference, subjunctives, or a condition. However, in its larger relationship between two actions. Of course, we can speak of different tenses of sentences as including past and future, and subjunctives, and so we can speak of very different compounded facts. For these, as will be pointed out below, we can use different connectives.

Consequently, different perceivable physical situations, or the compounded facts, may be conceived through different relations. These relations might be a 'togetherness of the physical things' and a 'cause-effect relationship of the physical things'. We can indicate them by using two sentential connectives 'and' and 'if ... then'. In other words, we can use these two connectives in order to express that they are the compounded facts of the perceivable world.

It means also that we should speak of the temporality of the sentential connectives. Since 'to be together' clearly is nothing other than 'to be at the same time (and at the same place also)'. Temporality will be true for the 'cause-effect' relation as well. For this kind of relation between physical things, in a certain time interval, cause must occur before effect.

This is why we have to consider the connectives as relations between sentences according to tense.

Of course, the use of the sentential connectives in the daily talk, as will be pointed out below, is different. For this reason, features of the connectives mentioned above will be not true for all their uses. On the other hand, there is a certain physical situation to which corresponds a certain connective. For instance, 'a pencil, **and** books, **and** my computer, **and** etc. are on my table' mean 'they are together on my table'. This usage of the connective 'and' clearly implies being at **the same place and the same time**. And thus, we can say that the connectives regulate the tense of sentences, and so relate facts to each other.

This is why we also cannot say, for instance, 'If the door will open, then my wife came.' For these situation, the main principle which we must obey will be constructed on the 'before and after relation between actions.' Hence this would be possible iff one action follows the other. In short, the time of these kind of actions, and the tenses of the sentences should be in accord with each other.

It also explains why we cannot count 'and' solely as syncategorematic, and its meaning cannot be explained and defined from a logical point of view alone. Since its role in language is deeper than expected. There might be ontological implications behind their symbolic representations in logic. We have to take into consideration this ontological side, if we want to understand the meaning of the connectives completely and exactly.

It would be interesting if the concept of 'togetherness' has a basic role in describing not only compounded facts, but single facts too. For a physical thing (or in one sense a single fact) implies implicitly or explicitly that the

other physical thing (or the fact) is a part of itself. Second, it would have a role in explaining features of indexicals.

If we are left with philosophical considerations, then we could accept that there are physical things around us with which we exist together. By physical things it is meant simply separately observable things like pencil, man, book, etc.

One way of expressing our knowledge about physical objects would be by way of sentences and words. There is a correlation between them, that is, between sentences and words, and physical things. It is a good sense, and it still holds, but it is incomplete.

In order to speak of physical things, we need not only the concept of 'a single physical things' but also the concept of 'togetherness'. For the concept of 'a physical thing', and even the concept of a 'single physical thing' implies explicitly or implicitly the concept of 'togetherness'.

We accept perceivable physical things like table, pencil, tree, bird, as single particles. But it is possible to imagine them as a unity of parts. Since each perceived singular thing consists of (perceivables) parts, we could think of them as a unity of other (perceivables) parts. On the other hand, some things, which we can accept as a single unity like the cosmos, society, humanity etc., also can be thought ipso facto as collection of other things, as consisting of different material parts, or of a specific kind of togetherness among these parts. Undoubtedly, these unities are ontologically real just as much as singular physical things are their constitutional elements. For these cases, the unity will be another name of a single part. It is also clear that here unity means a kind of togetherness. Since each unity of a perceivable thing consists of elements, that is, togetherness of these elements.

Of course we can speak of singular physical things without knowing their constitutional parts. It is not necessary to know, for instance, the constitutive nature of water or technical matters, even if we want to discuss or use them. However, it is possible to speak of a 'togetherness' for these things again. Since every single physical object must have elementary perceivable features, like shape, colour, position, smell, taste, weight, etc. by which we can know it. These physical objects exist as collection of parts, or we can acquire them according to these features. For this reason, each single physical thing is nothing but a collection, a totality or a togetherness of the some of its parts, or at least of its perceivable features. It means also, the concept of 'single physical thing' includes the concept of 'togetherness'. In order to speak of the ontological meaning of a 'single physical thing', we need the concept of 'togetherness'.

Some collections of physical things might have no special meaning. For instance, we can speak of a simple plurality of the things, like pencils, books, etc. Second, the collections of physical things on my table, like pencils, books, computer, etc. will not have any special ontological meaning either. However, in order to indicate these physical situations, namely any plurality or collections of physical things, we need the concept of 'togetherness'. Hence they are accepted as co-existing at a certain place. In other words, the concept of physical things (or situations) and togetherness can be thought of as correlated again.

Epistemological and ontological relations between particles and unities, their features and priorities would be discussed from a philosophical standpoint. Especially the holistic approach to the physical things (see, e.g., Fodor and Lepore 1992) includes some of these philosophical problems. But these problems will not be our concern.

Consequently, we can think of the concept 'physical thing' as necessarily including the concept 'togetherness'. For a single physical object, like a pencil, 'togetherness' means that it consists of wood and shape and colour and etc., that is, of different parts. These objects should exist clearly as collection (or as 'togetherness') of these parts. For this reason, the concept of 'physical things' should include explicitly or implicitly the concept of 'togetherness'. Unity, collection, group or anything else can be thought as a special kind of 'togetherness' of physical things, since each includes togetherness by definition.

We use habitually the term 'physical things' as indicating the objects of our perception. But in fact, what we can perceive is that the collection — the togetherness — of different physical things. 'Physical thing' is only a name of a kind of togetherness. In order to describe the physical world, we must take into account that physical things consist of different parts, of their togetherness. It means also that the meaning of the concept of 'physical things' must contain 'togetherness'. Pragmatically or as a shortland description, we can use the term 'physical things'. However, we need to remember that the meaning of this term includes 'togetherness'.

However we can imagine, or speak of, physical things as being together, that they would be at different and distance places. Some stars out of our galaxy and the pencil on my table are examples of this case. For this case, of course, we can think of connections between them, and say for instance, 'they obey the same laws along with all physical things in the cosmos'. Here again is the concept of 'togetherness' in the sense above indicated.

On the other hand, the connective 'and' can indicate 'separateness'. In fact, we can say that 'stars out of our galaxy and the pencil on my table occupy different spaces'. Clearly this usage of 'and' does not express togetherness, but a difference according to place. This is because of the meaning of 'and' in daily talk is different, and the spectrum of use of this connection, like the others of course, is broad. But if we want to indicate 'togetherness', we need the connective 'and'. Of course, it is possible to use the concept of 'togetherness' in a different manner. But I will use it only in the certain sense partly explained above.

Consequently, physical things, as pointed out above, can be taken as consisting of different elements, i.e., as togetherness of these elements. Any question like 'what is a physical thing?', which has been elaborated on by different philosophical points of view (see Quinton 1973), is not our concern. What I want to say is that we need implicitly or explicitly, 'togetherness' in order to speak of physical things. Since, physical things, whatever they are, could be thought of as consisting of elements, that is, togetherness of these elements. It means also, that we must speak of the togetherness of the elements in order to describe physical things.

Now we can ask 'what is the specifications of togetherness?'

First of all, the togetherness of the elements implies that they must be at the same time and at the same place for a being, for a physical thing. Togetherness would be thought as a bundle of things, qualities, or something else, in a particular part of space and position in time. In other words, to say that any physical thing consists of elements (like shape, colour, and other qualities and quantites) means that they are together, and thus their togetherness will be at the same time and at the same space in order to be an object. This is true not only for physical things but some kinds of things. Since, every object must have some features, which can be defined as the totality of some other features.

So, we can leave aside questions about the nature of physical things, and say that the meaning of togetherness can be defined according to temporality and spatiality.

This thought will be true for the connective 'and'. For, as explained above, 'and' implies and indicates 'togetherness'. Clearly, 'a and b and c and...' means 'a,b,c,... are together', and in the sense explained above, it means also that 'they are together at the same time and at the same space'.

If 'a' and 'b' are any two sentences, then to know also what 'a and b' means requires knowing tense relations (and sometimes the relations between spaces indicated by the sentences). According to this point of view, it is not necessary to define 'and' by its truth table. Its meaning, in a restricted area, like the other connectives, will depend not on truth values, but on knowing how we can verify it, is nothing else than to know how to use tense. It will refer also to what the concept of 'togetherness' indicates. So, the meaning of different connectives will depend on knowing different kinds of relations between times, or tenses.

We can think of the meaning of sentences in a similar way. It will be true that it is part of the meaning of a sentence to know how to use the tenses of a sentence. In fact, in Reichenbach's sense, we can speak of the tenses of the verb of a sentence. Undoubtedly, in order to understand Reichenbach's differentiation (see Reichenbach 1980, P. 287-299) of the reference time, speaker time and event time we must know first all the features of tense, or the relations between different times. A simple sentence like, as Reichenbach puts it, 'I saw John' implies three different tenses in a series together. Since, a sentence like 'I saw John', according to Reichenbach, does not imply only one time, but a time sequence, i.e., different tenses together, and thus the relation like 'before, after an together'. It means also, in order to understand a sentence we must know what kind of a relation there is between the past, present and future, or in other words, 'before', 'after' and 'togetherness' relations among the tenses. In fact, the difference in meaning between two sentences like 'I saw John' and 'I see John' depends exactly on tense. In order to understand the meaning of these sentences, we must pay attention not to their truth values, but to 'when this act occurred, or to the time sequence in Reicherbach's sense, or in short to their tense.' By the way, we can indicate the relationship between Reichenbach's differentiation of the reference time, speaker time and event time by the temporal connectives, or in one sense, by the connectives, since, this relations between concepts will be closely connected with the connectives in any way as explained above. It means also that to understand any sentence implies implicitly or explicitly to know the relations between different tenses.

For this reason, truthfulness and meaning of a sentence would be taken as depending on the togetherness and the time (and space) relationship, respectively. What a simple sentence (i.e., a sentence which has only one predicate and one subject) expresses would be true iff two things, which are indicated by subject and predicate, co-exist. This kind of existence, or togetherness, requires being at the same place and at the same time interval. Knowing the meaning of a sentence is nothing other than knowing whether this togetherness really exists. Similarly, the same thought is true for terms. Terms, like sentence, indicate togetherness, as explained above. For this

reason, the meaning of a term should be taken as depending on 'togetherness'. Togetherness in regard to the terms is also becoming of some qualities, parts, unities, etc. at the certain time interval and at the same place of a physical object, and therefore togetherness implies knowledge of the co-ordination of the time at which these parts of a physical object exist.

So it is possible to say that our knowledge about the co-ordinations of time and place is basic, primitive and formative elements of the meaning of our terms, and of the meaning of the single sentences as well. According to this point of view, the meaning of a sentences is not its truth-value, but depends on whether we know the togetherness of the subject and the object really exists in a certain time interval and at a place demanded by a sentence. The reference of a term is the object it stands for, or of a sentence is the fact it stands for, and thus a term or a sentence refers to a thing which consist of togetherness because of an object and a fact consisting of qualities, things, etc.

At this point we can speak of negative existential sentences like 'Pegasus does not exist'. First of all, their meaning will depend on togetherness and time, in such a manner that what the tense of these sentences can tell us. For, we know that this sentence is true because of the togetherness of its subject and its predicate is always true, i.e., it is true in past, present and future. So, we can think of this sentence as "it is true that we can imagine that "Pegasus and its non-existence are always together." This sentence refers that the co-ordination of the bundle of qualities of a thing like 'Pegasus' and the bundle of a thing which is known as 'non-existent'. Togetherness, or the co-ordination of the 'bundle of qualities' in a time, of course, would be interpreted as ontologically or linguistically, or epistemologically. However a sentence like 'the present king of France is bald' or 'the present king of France is not bald' will be false, since the elements of these sentence do not refer to anything together. But first of all, anybody who hears or reads this sentence thinks or asks probably whether it's about 'present king of France', there is not anybody king today. In other words, the meaning of this sentence depends on its tense; afterwards we can decide that togetherness of the object and predicate of this sentence do not indicate, at a certain time, i.e., now, anything else, and therefore is false.

We can devise different relations among facts, so co-ordinate them as different compounded facts. It is clear that this can be accomplished temporally and spatially. The way of expressing these different relations would be through different connectives. In other words, we can co-ordinate temporal (and sometimes spatial) relations among facts, actions situations, etc., and use the different connectives which correspond to this co-ordination. It means also, we can use different relations between the sentences, so we can express different facts. For this reason, knowing the meaning of an expression which may

include different connectives is nothing other than knowing how we use the tenses of the components of this expression. So, the reference of the different relations will be the different co-ordinations.

It seems possible that the features of 'togetherness', and therefore 'and', can be used regarding indexicals. Indexicals, however, include different problems, and I will be concerned only with temporal specifications, which depend on context of utterance.

The main problems for indexicals, roughly speaking, are concerned with meaning and tense as they depend on context. It is possible to treat these problems from Fregean perspective (see, for example Forbes, G., 1989, p. 465) and from the truth conditional semantics (see for example Lepore and Ludwig). On the other hand, it seems we can explain the meaning of indexicals, and their function in language as depending on the concept of 'togetherness'.

Let us take 'now' as an example of an indexical. As a linguistic entity it would be an adverb or a noun. From the logical point of view it can be treated as a one-place sentential connective, or as a sentential constant (see Kamp 1971, pp. 226-27). As is well known, it has a specific value in Russell's philosophy, and partly in Reichenbach's philosophy. In the case of indicating a time, it would represent McTaggart's A-series of time or B-series (see Oaklander, L.N., and Smith, Q., 1994 in which it is discussed). It can hold also with demonstratives as put by Marcus, Kripke, Kaplan and the others. Like other indexicals, roughly speaking, its meaning would be thought as depending on the context of use, or on the speaker.

From the point of the speaker, we can speak of different kinds of 'now', i.e., 'now1' and 'now2'. Now1 indicates the speaker's conscious state (or let's call it egocentric — or consciouscentric — time), whereas now2 indicates his biological, psychological, physiological, or in short, bodily situation (or in short body-centric time). These dual characters of 'now' show themselves in sentences, e.g., sentences like 'I am writing now', 'I am happy now' indicate a bodily situation, since they can be observable directly or indirectly. If a sentence, like 'I know myself (or I am conscious) just now why I can do it' indicates my conscious (and probably my subconscious too) situation, then here we can speak of 'now1'. Some verbs have a dual character. For instance, a sentence 'as you see, I am thinking now' clearly expresses bodily situation because somebody can observe my bodily situation, but the famous sentence of Descartes 'I am thinking, therefore I exist' expresses a conscious situation. These dual characters of 'now' help us solve some problems.

As well known, the sentence 'I am here now' has two different and controversial senses which are contingent, and apriori (see Forbes 1989, p. 484). It is contingent for I might be here or there; on the other hand, I know apriori where am I without experience, and therefore it has apriori information. It seems possible to explain this difference using the dual characters of 'now'. In one sense, 'now' refers to my conscious position, i.e., egocentric (conscious-centric) time; in another sense 'now' is used for a reference to my physical existence, i.e., body-centric time.

This last example explains also why we need to speak of different 'nows'. My body belongs to a physical world, and it obey the laws of this world. Like other physical things it has a history in time sequence, and therefore we can think of it as belonging to the past, present and future, i.e., to the temporal order. On the other hand, my conscious can happen only in now1. I can be aware of my present experiences, and remember past experience just in now1. I can use 'before' and 'after' in order to indicate to old remembrances and experiences, or be conscious of future experiences. I can remember past experiences, I can remember it in present-now1. To confuse 'now1' and 'now2' with each other leads to problems like the ones indicated above. They must be separated from each other, since at least their unities of measurement are different.

We use a quantitative unity, like a clock unity, when we speak of now2 because it belongs to the physical world. However, I cannot measure my conscious situation quantitatively. I can be aware of my conscious thought with my pure conscious, and therefore we can speak of an intuition in the Bergsonian sense for the now1, and say something about it qualitatively.

Generally we use 'now' in order to indicate an ordinary time interval in a sentence like 'he is coming now'. On the other hand, in the case of using 'now' as an indexical, it will consist of different parts which cannot be reduced to each other. In other words, in using the concept of 'now' as an indexical, because of its dual character, it must be taken to indicate 'now1' and 'now2' together.

On the other hand, it seems possible to use 'now1' and 'now2' together in order to indicate the indexical 'I'. It is clear that the sense of 'I' is nothing other than being aware of our own consciousness and body. The subject of our own experience is our consciousness and our body, perceivable now, i.e., at now1 and now2.

The explanations given above hold for the other indexicals, if they have dual character, viz., if they are used together in order to indicate the body and consciousness.

It seems possible to think that the dual aspects of indexicals depend on Cartesian dualism. In other words, rules governing features of indexicals derive from ontological and epistemological differences between the body and consciousness. For, an indexical can indicate both. If we confuse the two, certain problems will arise.

From our point of view, the important thing is that the role of 'togetherness' is a very basic concept not only for indexicals, but for understanding physical things and the feature of language, like single sentences and words. We can use also the concepts of 'togetherness' to indicate compounded facts, and therefore we can use the connective 'and' to construct compounded facts. However, we can speak of different compounded facts. In order to build these facts, we need different connectives.

The relations between (actually or potentially) perceivable, or mentally devisable physical things and also events, facts etc. imply, by definition, the coordination of them in time and place. These co-ordinations are expressible by means of different connectives. It means that co-ordinations constructed between things by means of different connectives, imply the regulations of the tenses of sentences. In other words, we can construct different relations or combinations between different kinds of physical things, events, facts, etc. by using different connectives. Each of them regulates the tenses of sentences and also the different things, events, facts, etc. indicated by these sentences. So connectives together with the sentences describe different compounded facts. It means also, in order to describe a compounded fact we use a certain connective.

It is possible to divide natural language connectives into four groups. In the first group there are different connectives which express different togetherness of the actions, facts, situation, or shortly, properties. Connectives in the second group express alternative relations between properties. The third group consists of connectives which emphasise the dependence of a definite property on a 'pre-existing property' like causation. If the properties depend upon each other mutually, like equality, we can express this dependency with connectives in the fourth group. Of course in these groups the tenses of sentences must be compatible.

In first group, we can speak of two different kinds of 'togetherness'. First, actions, situations, physical things, etc. may be simply together at the same time. These things, which are not causally related and not dependent upon each other, must be at the same time (and sometimes at the same space) or at the certain time interval at least, since to be together implies, by definition, to be at the same time and at the same space, as explained above. These actions or situations may be realised in the past or present or future; in this kind of togetherness, the tenses of the sentences must indicate the same

time. However, we can say only linguistically, for instance, 'I'll go and the pencil was on the table'. But this sentence will be meaningless, since we cannot speak of any compounded fact, and first of all, not imagine any — physical — relation between these two things because of their difference of the tenses, and there is not any common space between them which we can say they share. So, its reference will be empty, and for this reason, this sentence will be not have a truth value for us.

Within the other kind of 'togetherness', things are in order. Two actions, like 'I have just come and I will go in few minutes', are set up in order. The tenses of these sentences are different. In fact one action may follow another one without any causal relationship, and so the tenses of these sentences may be different: but in this case, there must be continuity between actions according to certain time interval. In this example, the act of 'coming' and 'going' are related to each other according to a reference point, viz., to a certain time interval. In this case, we can speak of the continuity of the actions, that is, the togetherness of the actions in a certain time interval. Here, the role of the connective 'and' is to indicate an interval, and to express togetherness in this interval. For this reason we don't say, for example, 'I have just come and I went in a few minutes ago'.

However, it is possible to think of a sentence as 'I have just come, I wait, and I went in a few minutes ago'. Here, there is a time interval between coming and going. Since, 'the act of coming' is before 'the act of going' in this interval. On the other hand, when we can interpret the meaning of the sentence 'I have just come and I went in a few minutes ago' as 'the act of going is before the act of coming', we could not think of two acts together. Hence, there is not any concordance between the tense of sentences (or the time of actions) according to a reference point, or to the same time interval, or between the times of these actions.

In other words, if the sentences indicate actions, physical objects or situations, we can speak of an agreeableness between the time of these actions, objects, and situations. However, a sentence may inform about non-physical things, for instance, mathematical things. In this case, we can speak only of the tense of the sentence. For these cases, first of all, we ought to think of 'agreeableness' between tenses of sentences. For example, when the sentence 'three is an element of the set of natural numbers, and is odd' is uttered, we think implicitly that these two properties always exist conjugationally. Since, this sentence articulates the fact that these two properties which belong to the number three must co-exist. In exactly the same way, it is clear at first glance that the sentence 'three was an element of the set of natural numbers and will become an odd number' does not express the 'conjugateness' required by the

connective ‘and’. Here, the connective ‘and’ is not used to express the conjugation of the properties within the same tense of the sentences.

Some words like ‘because of’, ‘then’, ‘before’, ‘after’, ‘since’, ‘until’, ‘for this reason’, etc. relate sentences, regulate the time of the events and the actions, indicate temporal events or actions, and they can be used like sentential connectives too. Also, these non-truth functional, or temporal connectives may express a condition and an ‘if... they’ sentence, or a togetherness depending on the context of utterance. For instance ‘they have a baby and the have married’ would mean ‘they have married because they have a baby’. This sentence, in this sense, indicates a condition. But, the same sentence can mean also ‘they have a baby and then married’. This sentence gives information that says only ‘two situations follow each other in a certain time interval’, so it expresses a togetherness in this interval. To say, for instance, ‘I’ll go before (after) he comes’ means that the two actions will happen together, but in sequence. Symbolization of these words, semantic analysis, meanings, etc. from temporal logic point of view are will be out of my concern. In any case, if we use as the non-truth functional connectives for to express togetherness, then we can treat them like sentential connectives.

Consequently, ‘togetherness’ implies sometimes a moment, but sometimes a certain time interval. In the first case, two actions or events must be together at the same time; in the second case they must be together in sequence, but of course in a certain time interval.

It is possible to speak of different kinds of togetherness as depending on the features of the sentences and the facts. For instance, ‘the pencil is made of metal, but is not heavy’ gives us information about the conjugateness of two properties, one of which is affirmative and observable, whereas the other is not. The second part of this statement expresses that the property of heaviness does not belong to this pencil. In other words, they do not exist together, at the same time and place. The whole of the statement means that to be made of metal and heaviness do not belong to the same object at the same time.

Togetherness may be devised negatively when there is an absence of two or more properties, actions, qualities etc. that need to be expressed. For instance, the statement ‘it will neither rain nor snow tomorrow’ also gives us information negatively about the conjugateness of two acts. In fact, this very last example is the expression of ‘joint denial’. This example also appears as a variation of the connective ‘and’, since it states that two properties do not (or cannot) coexist, or togetherness of the two properties at the same time will be not true or not real. In other words, this sentence tells us that ‘we will not observe tomorrow these two facts together’.

In the second group, the connectives are used to express the alternative relations (known as strong disjunction) between properties. This connective is needed when only one out of two properties is intended. These alternative relations may appear between the sentences which are both positive, both negative, or one positive and one negative (weak disjunction).

Relations of this sort must also be within a definite time interval. As a matter of course, it is obvious that the statement 'the lights were on or well be off' is without sense because of the tenses of the sentences. Especially when action-indicating sentences are considered, appropriateness not only with regard to time but to place as well must hold between the sentences. Otherwise, a senseless statement like 'I shall go to school, or the blackboard shall be painted green' which violates the usage of the connective 'or' shall arise.

We have to take into consideration the differences between 'p or q' and 'p v q', like the other connectives and their symbolic representations in logic. In fact, 'p v q' is not exactly a symbolic representation of 'p or q'. Not all sentences like 'p or q' and 'p v q' have the same characteristics. For, 'p or q' is simply a linguistic expression of the alternative relation, whereas 'p v q' is a symbolically shortened expression of the same relation in logic. In other words, the idea of 'alternative relation', for instance, can be expressed linguistically or symbolically. For this reason, we should not think of sentences like 'either Caesar died, or the moon is made of green cheese' as alternative relations (and also we should not symbolise them as 'p v q'), since, there is not a real disjunctive relations between the sentences of this expression. A real disjunctive relation should be established linguistically between sentences according to temporal (and spatial) concordance. For this reason, the sentence 'either Caesar died, or the moon is made of green cheese' does not satisfy a real alternative relation. So, we can say that while a symbolic representation 'p v q' indicates an alternative relation by definition, this sentence does not indicate the same relation. Therefore, 'p v q' does not symbolically represent a sentence like 'either Caesar died, or the moon is made of green cheese'. Hence, we cannot define any alternative relation between the components of this expression.

The symbols used in logic are usually thought as a metalanguage of sentential connectives. This may be true to some extent. But, in fact, it is possible to think that the logical symbols does not represent the sentential connectives, but together they indicate the same concept. So we can say that they are two different aspects of the same concept, namely, linguistic and symbolic aspects. According to this perspective, 'p or q' will be a linguistic expression, but 'p v q' a symbolic representation of the alternative relation. For this reason, there is not a strict correspondence between the symbolic and

linguistic representations of an alternative relation because they are different languages, or, systems.

An alternative relation says 'choose one between two different things'. If we take this relation linguistically, we must consider special conditions which require temporal and spatial features. So, the main role of the linguistic representations will be to regulate and co-ordinate the facts, actions, situations, etc. according to their temporal and spatial relations, whereas for the symbolic systems this kind of relation will not be necessary. Symbolic representation, that is, 'p v q', says choose one. For this reason, we have to think of sentential connectives as operators which regulate tense, but symbolic representation do not. However, we can define symbols in temporal logic as representing time, of course, if it is necessary. But we know that one aim of this representation in temporal logic is to show truthfulness of the sentences as depending on time, which will not concern us here.

We can define four different disjunctive relations. One of them is the relation with two positive sentences. The others have two negative components, or one component negative, but the other positive. Of course, like other connectives, there must be temporal and spatial concordance between the components of all kinds of linguistic expressions of the alternative relations, whereas logical symbolism of this relation will not need any more than this requirement.

The third possible relation between sentences (and also between properties) is cause-effect relation. This relation constructed with the aid of the connective 'if ... then', requires an appropriateness with regard to time and space too. Another property of cause-effect relation which holds between sentence is that it expresses a priority-posteriority (clearly this relation hold also temporality) relation. For, the effect can not be prior to the cause to which it gives rise; or in a conditional relation we have to think before the premise and after the consequence as depending on it.

Within the actual usage of the language, the antecedent of the connective 'if ... then' may be interchanged with consequent. In fact, we can say 'in order to give a lecture, I must go to school'. Nevertheless, in such a modification the relation of conditionality and the connection of priority-posteriority with regard to time is still preserved. For, a closer outlook will reveal the fact that the act of 'given a lecture' in this statement manifests, as a prior condition, the realization of yet another act, i.e., the act of 'going to school'.

As in the alternative relation, we must separate from each other the linguistic and symbolic representation of the 'cause-effect' relationship. Strict and material implication reflect these differences partly. For, strict implication must obey the rule of temporal (and sometimes spatial) concordance, which is indicated above, whereas formal rules need only logical features.

The fourth group expresses equality and mutual implication between sentences. This case is expressed by the connective 'if and only if'. There must be, of course, a concordance between the tense of sentences as explained before.

To sum up, relating sentences to each other with various connectives means also to co-ordinate facts, actions, situations, etc. For these things, the co-ordination should happen in time (and in space sometimes). So, in order to relate sentences by means of connectives we take into consideration always a temporal (and sometimes spatial) concordance between facts. The tense of sentences, of course, must represent this concordance at the linguistic level.

It should be remarked that this consideration does not mean omitting the well known relations between sentential connectives and truth table. It means only, if we think of the connectives as depending on the tense of sentences, that we can define the connectives from different points of view.

Different relations, set up by different connectives between sentences, give us new information. In fact, setting up of relations between sentences by means of connectives is due to the need to obtain a new knowledge in addition to that contained in particular sentences. For, the knowledge which is stated by means of a single sentence may not be sufficient in describing a situation. It means that every connective in language gives us a new information which we can not express with one or two separate sentences. To express togetherness by means of 'and', for example, means simply that at least two things are together. This is, in act, new knowledge just because of 'togetherness'. Togetherness implies two things (actions, situations, etc.) which should (would, will, etc.) be at the same time and at same place. To be at the same time and at same place means new information, information which will not be depending on each sentence separately.

Taking the connectives and sentences as a unit, it leads us to speak of modalities of the connectives.

Modality is thought as depending on the sentence, viz., as their features into manner, for instance, 'it is possible that p'. However, modality is a feature which can be thought of as depending on the locality and temporality expressed by any sentence between subject and predicate, or by the connectives

between the sentences. So, to say 'it is possible that p' means also 'the subject and the object of a sentence p are possible together at certain place and time'. For instance, 'it is possible that the pencil is green' means that 'the subject and object of this sentence are possible together, at the same time and at the same space of the this object'. Berkeley's famous sentence 'esse est percipi' says clearly that 'it is necessary that essence and perception are (or must be) together at the same time and at the same object, or at the same space of an object'.

On the other hand, to say that 'it is possible that p and q' means 'p and q are possible together (here and) at a certain time'. For this reason, togetherness itself, for instance, may be necessary, probable, etc. as independent of the components of an expression. Just to say 'it is here now and it is there now' would be taken as an example of the modality of the connectives because the modality does not belong to the components of this expression 'being here' and 'being there', but to their togetherness. For, this expression clearly means 'it is not possible to be here and there at the same time'. A sentence like 'I'm sure that I put my glasses and cigarette in the bag' could be taken in the manner 'they must be in the bag' or 'it is necessary that my glass and cigarette are together in the bag'. Clearly, the modality of this sentence is not dependent upon the components, each sentence, but their wholeness, namely, the togetherness of the locality and temporality of the components. So, the modality of each sentence may indicate a possibility, but they together may express an impossibility. Say for instance, 'x is a prime number' and 'x is a even number' would be separately possible, but not together. In fact, if x is a rational number, then it will be necessarily true that 'x is prime or even number'. Here again the possibility or necessity does not belong to the sentences, but to the connective too. This means also a new information comes from the connectives. So we can express the symbolic representation of the modality of connectives as follows:

$$\Box \wedge, \square \wedge, \diamond \wedge, \heartsuit \wedge \dots$$

Instead of

$$\Box(\dots \wedge \dots), \diamond(\dots \wedge \dots), \dots\dots\dots$$

Since, in the second representation the modality is thought as depending on the sentences.

So, we can drop the well-known equality, and write this inequality.

$$\Box (p \wedge q) \neq \Box p \wedge \Box q$$

However, the distributivity of the modal operators upon the sentences can be true, of course, for special cases (for some logical frames).

I hope we can understand and explain, for instance, complementary, uncertainty, etc. by means of the modality of connectives. For example, uncertainty principle about the impossibility of the measurements of momentum and place of a particle at the same time (or together), but the possibility of measuring them separately could be shown with the following symbolization.

' $\diamond p$ ' and ' $\diamond q$ ' but they can not be together, viz.,

$$(\diamond p \sim \diamond \wedge \diamond q).$$

Since, p and q can be separately true, or possibly true; but not together. For this reason, we can not write:

$$\sim \diamond (p \wedge q)$$

Because of the rule of distribution has been drooped for the example above indicated.

This thought about modality and connectives is clearly against Montague's principle, which says 'the meaning of an expression is determined by its parts'. Since, the meaning as well as modality of an expression depends on the connective, not on its components, viz., on the sentences or on the elements of a sentence. This kind of thought means a different logical frame. This frame could give us new perspectives about the physical world because we can say that 'what we see is nothing else than how we see'.

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