

CONTINGENCY AND TIME

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ABSTRACT: In this article I offer an explanation of the need for contingent propositions in language. I argue that contingent propositions are required if and only if there is a need for propositions which can be both true and false in different circumstances. Indexical expressions enable the same proposition to be expressed in different contexts, thus allowing it to be both true and false. Examination of the different indexical expressions shows that temporal indexical expressions are the ones that do this. Furthermore, describing the change in the temporal A-determinations of past, present, or future, requires using contingent propositions. The conclusion of this article is that change in the temporal A-determinations is the explanation for the need for contingent propositions in language.

KEYWORDS: contingency, indexicals, time

1.

Language includes two types of propositions: contingent propositions, which are both possibly true and possibly false; and non-contingent propositions (that is, tautologies and contradictions), which are either necessarily true or necessarily false. The two types of propositions can be viewed as characterizing different fields of discourse. While contingent propositions describe the physical and the mental realms, tautologies describe the mathematical and the logical realms.

The question I discuss in this article is what accounts for the difference between the different fields of discourse. Why do some fields of discourse, for example include propositions which can be both conceivably true and conceivably false (that is, contingent propositions), rather than only propositions which can be either conceivably true or conceivably false, but not both (that is, tautologies and contradictions). In other words: what feature, or features, of reality account for why contingent propositions are needed to describe the physical and the mental realms, and superfluous for describing the mathematical and the logical realms.

I begin my inquiry in the next section by discussing the need for contingent propositions in any field of discourse. I argue that contingent propositions are required in any field of discourse if and only if there is a need for propositions which can actually be both true and false (in different circumstances). Several questions arise at this stage. Firstly, notwithstanding the previous conclusion, it is doubtful whether the same proposition can actually be both true and false. It is necessary in this context to distinguish between a sentence and a proposition.

Obviously, a sentence, as a structures combination of signs, can in different circumstances express different propositions, and therefore can express in different circumstances propositions with different truth-values. However, in the present context it is assumed that the same proposition can be both true and false, rather than that the same sentence can express different propositions with different truth-values.

In section 3 I discuss the possibility of the same proposition being actually both true and false. I distinguish between demonstrative and indexical expressions, and argue that only the latter expressions enable the same propositions to be expressed in different contexts, thus making it possible for the same proposition to be both true and false in different circumstances. This implies that only indexical expressions can explain the contingency of propositions in language. The proof that indexical expressions enable the same propositions to be expressed in different contexts depends on another important assertion, according to which indexical expressions are irreducible, and therefore indispensable for describing reality. This implies that there are features of reality whose description necessitates the use of indexical expressions.

In the sections that follow I examine the different indexical expressions, which include the first-person ('I'), the spatial indexical expression 'here,' and the temporal indexical expression 'now,' in order to determine which indexical expression (or expressions) actually does enable the same proposition to be both true and false. In section 4 I show that the indexical expression 'I' does not enable the same proposition to be both true and false. In section 5 I show that the spatial indexical expression 'here' does enable the same proposition to be both true and false. However, the spatial indexical expression 'here' not only assumes the temporal indexical expression 'now,' but is also reducible to it. This conclusion implies that the explanation for the possibility of the same proposition being both true and false lies in the temporal indexical expressions. In section 5 I examine the temporal indexical expression 'now,' and show that the temporal indexical expression 'now' enables the same proposition to be both true and false in different circumstances.

My conclusion is that the change in the temporal A-determinations of past, present (now), and future explains the need for propositions which can actually be both true and false, and therefore that contingent propositions are needed to describe such change. Thus, the conclusion of my article is that time, and more specifically the change in the determinations of past, present and future, is the feature which explains the difference between the contingent and the necessary

fields of discourse. This, I believe, explains the affinity between time and modality, as reflected, for example, in Spinoz'a *Ethics* and in modern logic.¹

2.

The question I am asking can be clarified by the following example. Consider the following simple hypothetical reality R_1 , which consists of a two-dimensional space, which is either black or white:

R_1		1	2	3	4	5
A						
B						
C						
D						
E						

Reality R_1 can be fully described with the help of only 25 sentences, which include two spatial coordinates and one of color, thus: A-1-B[lack], A-2-W[hite], A-3-B, and so on.² Any other combination of signs, for example, A-1-W, which expresses a false proposition, is superfluous for describing reality R_1 . This seems to imply that such combinations of signs, which supposedly express false propositions, need neither express contingent propositions, nor even be considered a meaningful combination of signs, in the language which is used to describe reality R_1 . Furthermore, it seems that for a language to fully describe reality R_1 , the combinations of signs which express the true propositions, that is, A-1-B, A-2-W, and so on, need not express contingent propositions.

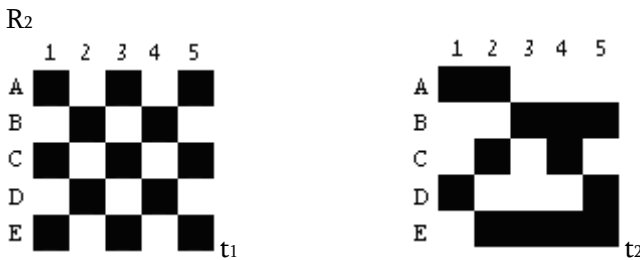
If the previous considerations are correct, reality R_1 can be fully described by a language whose semantic rules imply, for example, that the combination of signs "A-1-B" expresses a true proposition, while the combination of signs "A-1-W" expresses a false proposition. An example for this suggestion can be found in the semantic rules of propositional calculus, which imply that the combination of

¹ See, for example, Benedictus de Spinoza, *Complete Works*, trans. Samuel Shirley (Cambridge: Hackett, 2002), part 2, proposition 44, corollary 1; Josh Parsons, "A-theory for tense logicians," *Analysis* 63 (2003): 4-6.

² Russell and Wittgenstein were divided on the question whether a complete description of a reality requires a general proposition. While Russell thought that there are general facts (Bertrand Russell, "The Philosophy of Logical Atomism," in his *Logic and Knowledge* (London: George Allen & Unwin, 1956), 183-84, 236), Wittgenstein thought the opposite (Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, trans. David F. Pears and Brian F. McGuinness (London: Routledge & Kegan Paul, 1963), 4.26). However, this debate is irrelevant for the present example, because the number of facts in reality R_1 is fixed and finite.

signs “ $p \vee \sim p$ ” expresses a true proposition, while the combination of signs “ $p \wedge \sim p$ ” expresses a false proposition. In fact, it seems that in order to fully describe reality R_1 it is possible to use a language in which the combinations of signs “not-A-1-B” and “A-1-W” will not even be a syntactically well formed sentence, in the same sense in which the combination of signs “ $p \sim p$ ” is not a well formed formula in propositional calculus. Thus, it seems that the minimal conceptual complexity which is needed in order to fully describe reality R_1 includes only 25 necessary propositions. Furthermore, in the spirit of the *Tractatus* it might be said that the conceptual complexity of the language should reflect the complexity of the reality that it represents.³ If contingent propositions are not required for describing reality R_1 , it seems that reality R_1 should not, and perhaps even cannot, be described by the use of contingent propositions.

It may seem that time is an obvious candidate for explaining the need for contingent propositions for describing reality. In order to examine this suggestion, let us consider a hypothetical temporal reality R_2 , which results from the addition of time to reality R_1 . For simplicity, I assume that this reality includes only two different times, t_1 and t_2 , thus:



Prima facie, the proposition A-5-B is true at time t_1 while false at time t_2 . If this is correct, then this proposition must be contingent in order to allow for a full description of reality R_2 . The question, however, is how to understand the proposition “A-5-B”: is it a general proposition, namely that there is a time in which the color of A-5 is black; or a specific one, namely that at that specific time the color of A-5 is black? If the former is the correct interpretation of proposition “A-5-B,” then this proposition is true both at time t_1 and time t_2 , and need not be a contingent proposition. If the latter is the correct interpretation of the proposition “A-5-B,” then this proposition has an implicit temporal component, and should be explicitly formulated as, for example, “A-5-B- t_1 .” According to this interpretation, reality R_2 is fully described with the help of 50 necessary propositions, which include 2 spatial coordinates, a color coordinate, and a temporal coordinate. The

³ Wittgenstein, *Tractatus Logico-Philosophicus*, 4.04.

conclusion seems to follow, therefore, that describing reality R_2 does not necessitate the use of contingent propositions.

It should be noted that the previous analysis is not committed to any realist assumptions. Even if the explanation of truth in term of correspondence is misleading, or even outright false, it has no bearing on the previous analysis. The question is, given the fact that in certain areas of discourse some of the propositions are true and others are false, what is the explanation for the possibility of these propositions being both possibly false and possibly true. The distinction between reality and the language used for its description is nothing but a useful device for investigating the function that contingent propositions fulfill in language.

This analysis of the need for contingent propositions might be criticized for concentrating on the use of language for the purpose of describing. For, as (the later) Wittgenstein has taught us, language is used in various ways for different purposes, which are not necessarily associated with descriptions.⁴ In answer to this criticism, it should be noted that the question I am asking necessarily relates to the use of language for describing. For the question under consideration relates specifically to propositions – rather than questions, commands or requests, which cannot be characterized either as contingent or as necessary – and therefore specifically relates to the use of language for describing.

It may be objected that the demand that a certain complexity of language be actually used, in order to explain its need, is too strong. In order to explain why a certain complexity of language is needed for describing reality, all that we are required to show is that this complexity describes a possible state of affairs. In the case under consideration, the need for any contingent proposition p is explained by the fact that reality includes both the possibility that p and the possibility that not- p . Thus, according to this objection, the hypothetical reality R_1 includes 50 different possible states of affairs, 25 of which are actualized. Hence the language which is needed in order to fully describe reality R_1 consists of 50 contingent propositions, of which 25 proposition are actually true. Alternatively, the same objection can be formulated in terms of 'possible worlds': language must describe not only the actual world, but all the possible worlds which are accessible from the actual world.

The answer to this objection is that it is misguided. Obviously, if reality includes unrealized possibilities, the language which is needed in order to describe this reality must include these possibilities. Likewise, if it is assumed that the idea

⁴ Ludwig Wittgenstein, *Philosophical Investigations*, trans. Gertrude E. M. Anscombe (Oxford: Basil Blackwell, 1953), paragraph 23.

of possible worlds gives an accurate account of modality, it is clear that the language used for describing the actual world must not only include the conceptual complexity which is required to describe not only the actual world, but also all the accessible possible worlds. However, the question is what explains the inclusion of these possibilities in a certain reality? For example, if indeed reality R_1 includes the possibility of A-1-W, what constitutes this possibility? What can explain the difference between a reality which includes the possibility of A-1-W and a reality which does not include this possibility? Or, using the idea of possible worlds, what can explain the difference between a reality in which the actual world is the only possible world and a reality in which the actual world is only one of many possible worlds which are accessible from it? The attempts to rely on these notions in order to explain the need for contingent propositions fail, for they only restates in different terms what calls for an explanation. Obviously, their failure to offer a substantive answer to the question I am asking does not imply that they are not beneficial or fruitful for investigating other aspects of modality. However, in the present context they leave the question under consideration unanswered.

A different attempt to explain the need for contingent propositions is to turn to epistemology. The suggestion is that although reality may be described without using contingent propositions, the fact that we do not know which state of affairs actually obtains forces us to use a language which includes contingent propositions, that is, propositions which can be both conceivably true and conceivably false. However, this suggestion fails, for the supposition that we do not know if a state of affairs obtains or not assumes that both possibilities are open, and therefore assumes, rather than explains, the conceptual complexity which is reflected by contingent propositions.

What is required, in order to explain the need for a certain conceptual complexity for describing reality, is to show how this complexity is actually used for describing reality. The conceptual complexity of contingent propositions, which is currently under consideration, is reflected by the possibility that propositions may be both true and false. This implies that in order to explain why contingent propositions are needed to describe a certain realm of reality, it must be shown that describing this realm of reality requires some propositions to be true on some occasions and false on others.

It follows from the previous consideration that the need for contingent propositions for describing reality can be found only in propositions whose truth-value is not absolute, but varies in different circumstances. Obviously, showing that describing a certain realm of reality requires the use of propositions whose

truth-value varies in different circumstances proves that one type of contingent propositions, that is, contingent propositions whose truth-value varies in different circumstances, are necessary for describing this realm of reality. However, propositions whose truth-value varies in different circumstances can also explain the inclusion in language of contingent propositions with an absolute truth-value. For contingent propositions with an absolute truth-value can be reduced to propositions whose truth-value varies in different circumstances. For example, sentences which include the temporal indexical expressions 'past,' 'present,' and 'future' can be used to define contingent propositions with an absolute truth-value of the type " ψ precedes ϕ ," thus: " ψ precedes ϕ " if and only if " ψ preceded ϕ in the past, or ψ precedes ϕ now, or ψ will precede ϕ in the future."⁵

It is doubtful, however, whether the same proposition can be both true and false in different contexts. In fact, some may argue that if a sentence expresses propositions with different truth-values in different circumstances, then it follows that it does not express the same proposition in different circumstances. I should stress that it is necessary, in order to explain the need for contingent propositions, for the same proposition to be both true and false in different circumstances, rather than for the same sentence, that is, the same combination of signs, to express both true and false propositions in different contexts. In the next section I present a proof that indexical expressions let the same proposition be expressed in different circumstances. This proof relies on a second claim, which is important for the present discussion, according to which indexical expressions are indispensable for describing reality. This is due to the fact that indexical expressions are irreducible to expressions which do not include indexical expressions, and therefore descriptions which do not include indexical expressions cannot be synonymous with descriptions which include indexical expressions. Together the two claims show that indexical expressions can explain why

⁵ Arthur N. Prior, *Papers on Time and Tense* (Oxford: Clarendon Press, 1968), 64. The truth-value of almost all propositions in some natural languages is sensitive to time. This is due to tense, which does not allow temporally neutral propositions to be formulated in these languages. However, it is possible to introduce a convention, according to which propositions in the present tense which do not include temporal indexical expressions are interpreted as temporally neutral propositions. Thus, according to this convention, the propositions " a is F " is interpreted as " a was F , or a is F now, or a will be F ." As mentioned by Frege, this is not an arbitrary convention, for there are times in which the present tense is used in order to remove temporal restrictions, as in the case of mathematical propositions (Gottlob Frege, "Logical Investigations: Thoughts," in *Collected Papers on Mathematics, Logic and Philosophy*, ed. Brian F. McGuinness, trans. Peter. Geach and Robert H. Stoothoff (Oxford: Basil Blackwell, 1984), 358 [64]).

contingent propositions are needed for describing reality. What remains to be examined, in the sections that follow, is which indexical expression actually enables the same proposition to be both true and false.

3.

The following sentences include different indexical and demonstrative expressions:

- (1). This is New-York.
- (2). I live in New-York.
- (3). Dan lives here.⁶
- (4). There is no university in New-York now.

The first distinction I would like to turn attention to is the distinction between demonstrative expressions, for example, 'This' in sentence (1), and indexical expressions, for example 'I,' 'here,' and 'now' in sentences (2)-(4).⁷ The expression 'This' is a demonstrative expression, because its reference is determined either by the intention of the speaker who utters this expression, or by an accompanying act of demonstration.⁸ It is impossible to utter, for example, "This is New-York," without intending to refer to something specific, or without an accompanying act of demonstration, and yet to successfully refer to anything, or express a proposition. The category of demonstrative expressions includes, for example, the expressions 'That,' 'you,' 'he'/'she,' and 'here.'⁹ In contrast, the reference of indexical expressions, such as 'I,' 'here,' and 'now,' is independent of the intention of the speaker or an act of demonstration, and is determined exclusively by the circumstances of their use.¹⁰

⁶ The sentence should be understood as tenseless, that is, as: "Dan lived, lives, or will live here." This lets me focus on the spatial indexical component of the sentence.

⁷ The distinction between demonstrative and indexical expressions derives from Kaplan. See: David Kaplan, "Demonstratives," in *Themes from Kaplan*, ed. Joseph Almog, John Perry and Howard Wettstein (Oxford: Oxford University Press 1989), 490-91.

⁸ There is a controversy as to what determines the reference of a demonstrative expression. However, this controversy has no significance for the present discussion.

⁹ The expression 'here' can be used both as a demonstrative expression, for example, when the speaker points to certain place and says: "We shall park here tonight," and as an indexical expression, in which it is used to refer to the position of the speaker. I should point out that in sentence (3) the expression 'here' is used as an indexical expression.

¹⁰ The scope of their reference (for example, whether the indexical expression 'now' refers to the present day or the current year) can, however, be determined by the intention of the speaker.

Each of the demonstrative and the indexical expressions which appear in sentences (1)-(4) lets the same sentence express propositions with different truth-values in different circumstances. However, the question is whether these expressions enable the same proposition to be both true and false. This depends on whether the sentences which include these expressions express the same proposition in the different circumstances in which they are used.

Some might argue that the possible difference in truth-value indicates that different propositions are being expressed by sentences (1)-(4) in different circumstances. However, that depends on the specific understanding of the term 'proposition.' There are different legitimate uses for this term that depend on its function in the confines of a specific conception of language, which itself may be concerned with different aspects of language. Further complexity is introduced because of the special topic of indexical expressions, which raises further difficulties.¹¹ Fortunately, in the present context there is no need to go into this intricate field. In the confines of the present discussion, which concerns only the question of contingency, it is sufficient to rely on a general characterization of the term 'proposition,' which need not resolve all the difficulties and contentions surrounding this notion. What concerns me in this context is the distinction between a sentence, as a mere combination of signs, and the content of the sentence, which is the subject of the truth-value.¹² The basis of this distinction is the arbitrary relation which obtains between signs and content: the same signs can be used in order to express different content, and the same content can be expressed by different signs. This distinction does not rely on any complicated theoretical considerations, and can be demonstrated with the help of a simple (if not trivial) example: the same sentence can express different propositions, for example, "Dan was at the bank"; while different sentences can express the same proposition, for example, "Dan has a canine" and "Dan has a dog."

The criterion I use in order to determine whether the same proposition is expressed by the same sentence in different circumstances is this: if the same sentence expresses different propositions in different circumstances, it is possible to distinguish between the different propositions with the use of different signs.¹³

¹¹ See, for example, John Perry, "The Problem of the Essential Indexical," *Nous* 13 (1979): 3-21.

¹² Obviously, this characterization does not imply that a difference in truth-value (in different circumstances) indicates a different content.

¹³ I do not suggest that this is the only possible criterion. However, I should point out that it is impossible to use Frege's criterion for a difference in sense, in order to determine whether the same proposition is expressed in different circumstances (Gottlob Frege, "On Sense and Reference," in *Translations from the Philosophical Writings of Gottlob Frege*, ed. and trans.

The consideration which supports this criterion is straightforward: This distinction between sentences and propositions stems from the arbitrary relation that obtains between signs and content. The claim that different content is expressed by the same sentence therefore implies that the use of the same signs in order to express this content is coincidental. This distinction therefore implies the possibility of distinguishing between the different contents by the use of different signs.

I should point out that this criterion does not assume that every language actually contains the linguistic complexity (in contrast to the conceptual complexity) which lets any two different propositions formulable in that language be expressed by the means of two different sentences. This criterion assumes, however, that it is possible to introduce into every language the linguistic complexity which is needed in order to reflect its conceptual complexity, thus enabling any two different propositions in that language to be formulated by means of different sentences. This can be done simply by introducing new words into that language, which would reflect the conceptual distinctions which that language includes.

An important implication of this criterion is this: Suppose we examine whether two occurrences of the same sentence express the same proposition. This criterion implies that if a certain sign (or combination of signs) can be used in order to substitute part of the sentence in one occurrence with any sign, without any change in meaning, but not in the other occurrence of this sentence, then it follows that these sentences express different propositions. If, however, it is always possible to use the same sign (or combination of signs) in order to replace parts of a sentence in each occurrence, without a change in meaning, then it follows that these sentences express the same proposition in all circumstances. In order to understand this criterion, let us examine the sentence mentioned earlier, "Dan was at the bank." This criterion implies that if it is possible to replace the word 'bank' in one occurrence of this sentence with 'land alongside a river or a lake,' without a change of meaning, but not in another occurrence of this sentence, then it follows that different propositions are expressed in each circumstance. If, on the other hand, whenever a certain phrase can be used to substitute the word 'bank' in one occurrence of this sentence, without a change in meaning, the same phrase can also be used in order to replace the word 'bank' in

Peter Geach and Max Black (Oxford: Basil Blackwell, 1970), 56-57 [25-26]). For, as has been argued by Evans, Frege's criterion is not applicable to at least some of the cases currently under consideration (Gareth Evans, "Understanding Demonstratives," in *Demonstratives*, ed. Palle Yourgrau (Oxford: Oxford University Press, 1990), 84-85).

the other occurrence of this sentence, then the same word is used with the same meaning in both occurrences. Thus, it is possible to conclude that the same proposition is expressed on both occasions.¹⁴

This criterion can therefore be used in order to determine whether demonstrative and indexical expressions let the same sentence in which they appear express the same proposition in different circumstances. This criterion can be used in order to determine, for example, whether the sentence (1) "This is New-York" expresses the same proposition whenever it is used, or whether it expresses a different proposition each time: if it is possible to replace the word 'This' with another expression, without a change in meaning, on one occasion, but impossible to replace this word with the same expression on another occasion without a change in meaning, then it follows that on each occasion this sentence is expressing a different proposition.

However, in light of the above, a simpler way of deciding on this question is available: The question I am considering is whether two occurrences of a sentence, in which there is an indexical or a demonstrative expression, express the same proposition. If different propositions are expressed on each occasion, then according to the criterion I formulated earlier it must be possible to replace this expression on one occasion with a different expression, without a change in meaning, but not on the other occasion. That is, it must be possible to express each proposition by means of a sentence which uniquely conforms to this proposition. This, however, is tantamount to a reduction of these expressions.

Thus, suppose it is shown that either demonstrative or indexical expressions are irreducible, in the sense that a sentence which includes an expression of this category is not synonymous with any sentence which does not include these expressions. This implies that it is not possible to replace these expressions with any expression in one occasion, without a change of meaning, but not in another occasion. According to the criterion I formulated earlier, this conclusion indicates that sentences which include these expressions express the same proposition on the different occasions of their use. The irreducibility of these expressions therefore implies that they let the same proposition be expressed on the different occasions.

Turning our attention first to demonstrative expressions, it seems that these expressions are reducible, in the sense that in each occasion of their use they can be replaced with expressions which do not include demonstrative expressions. It

¹⁴ This criterion may seem vacuous, for its application seems to assume that it is possible to distinguish between the different meanings of the word 'bank' in each occurrence of this sentence. As I show next, this criterion is still useful for the current purpose.

makes no difference whether the reference of a demonstrative expression is determined by the intention of the speaker or by an accompanying act of demonstration. Either way, each occurrence of a demonstrative expressions can be replaced by a description, which either describes the intention of the speaker or the accompanying act of demonstration. For example, a particular occurrence of the demonstrative expression 'this,' which occurs in the sentence (1) "This is New-York," can be replaced by either the "The city we are seeing,' or 'The city I am pointing at.'

Thus, in the case of demonstrative expressions there are two possibilities: either the demonstrative expression can be replaced by an expression which includes an indexical expression or it can be replaced by an expression which does not include an indexical expression. If the demonstrative expression can be replaced by an expression which does not include an indexical expression, then the resulting sentence expresses the same proposition in each occasion of its use. However, the truth-value of this proposition is absolute, as it is independent of the circumstances in which the sentence is expressed. If the demonstrative expression is replaced by an expression which includes an indexical expression, then the question is whether indexical expressions let the same proposition be expressed on different occasions, as discussed next. It can therefore be concluded that demonstrative expressions do not let the same proposition be expressed on the different occasions of their use.

Turning now to indexical expressions, it is important to stress the fact that the reference of these expressions is not determined by the intention of the speaker or an accompanying act of demonstration. A significant implication of this fact, which distinguishes indexical expressions from demonstrative expressions, is that indexical expressions are irreducible. As I explained earlier, the irreducibility of indexical expressions implies that in different occasions of their use, sentences which include indexical expressions express the same proposition.

The claim that indexical expressions are irreducible originates from the writings of Perry (although Perry himself did not distinguish between demonstrative and indexical expressions.¹⁵ Perry's contention, which is formulated in terms of Frege's conception of language, is that sentences which do not include indexical expressions do not have the same sense as sentences which include them. Obviously, indexical expressions are not generally reducible, in the sense that it is impossible to replace all the occurrences of an indexical expression with a single expression which does not include indexical expressions. This is clear from

¹⁵ John Perry, "Frege on Demonstratives," *The Philosophical Review* 86 (1977): 474-97; Perry, "The Problem of the Essential Indexical," 3-21.

the fact that a sentence which includes an indexical expression expresses in different circumstances a proposition, or propositions, with a different truth-value, while a sentence which do not include indexical expressions expresses a proposition with a determined truth-value in every occasion. However, it is also impossible to replace a specific occurrence of an indexical expression with an expression which does not include indexical expressions. Any attempt to replace an occurrence of an indexical expression will result in a sentence with a different sense, as Frege's criterion for a difference in sense clearly shows:¹⁶ For any expression φ , with which we attempt to replace, for example, the indexical expression 'now' in the sentence "The meeting takes place now," it is possible to believe that "The meeting takes place at φ ," but not that "The meeting takes place now," or vice versa.

It is important to note that Frege's criterion, although formulated in epistemic terms, actually relies on the semantic difference between the two sentences. Obviously, it is possible for someone who does not understand the meaning of either of the sentences "Dan is a bachelor" and "Dan is man who has never married" to accept one while rejecting the other. Frege, however, would not want to say that these sentences have a different sense. Whoever understands these sentences should understand that they are synonymous, and therefore would be unable to accept one assertion while rejecting the other. Accurately formulated, Frege's criterion for a difference in sense therefore states that two sentences have a different sense if whoever understands them cannot accept one proposition while rejecting the other. As this formulation clearly shows, the epistemic aspect of Frege's criterion serves merely as an indication for the semantic relation between different sentences.

In the case under consideration, it is obvious that there is a possibility that a subject who understands both sentences will accept one proposition while rejecting the other. For, as the previous example clearly demonstrates, while the sentence "The meeting takes place at φ " may express a proposition which is true at all times, the sentence "The meeting is taking place now" only expresses a true propositions at the time of the meeting. In order to know that this sentence expresses a true proposition, further information is therefore required, according to which "now is φ ." This clearly shows that the two sentences do not have the same sense. It therefore follows that a sentence which includes an indexical expression does not have the same sense as a sentence which does not includes an indexical expressions.

¹⁶ Frege, "On Sense and Reference," 56-57 [25-26].

Is it not possible, however, that in every case in which the subject believes that “The meeting takes place now” there is another sentence, which does not include an indexical expression, which expresses what the subject actually believes? According to this suggestion, a sentence which includes an indexical expression does not explicitly express the specific proposition which the subject actually believes. Thus, it might seem that although it is possible to believe that “The meeting takes place at φ ” without believing that “The meeting is taking place now,” in fact in each time a subject believes that “The meeting is taking place now” he actually believes a proposition which is expressed by a sentence of the type “The meeting takes place at φ .”

This suggestion, however, fails for the following reason: as shown by Perry, the subject's beliefs do not determine the reference of the indexical expressions he uses.¹⁷ The indexical expression 'now' necessarily refers to the time in which it is used, while the subject's beliefs can be wrong and refer to another time. There is a possibility, therefore, that the subject believes both that “The meeting takes place at φ ” and that “The meeting is taking place now,” while one proposition is true and the other is false. This clearly shows that the proposition in which the subject believes, when he believes that “The meeting is taking place now,” is not identical with the proposition “The meeting takes place at φ .” The fact that the reference of indexical expressions is independent from the subject's beliefs reflects an essential feature of indexical expressions, which distinguishes them from demonstrative expressions, and precludes their reduction.

I should point out that this conclusion does not imply that indexical expressions are irreducible to other indexical expressions, but only that a complete reduction of indexical expressions is impossible. This conclusion implies that indexical expressions in general are necessary for describing reality, but it does not imply that each indexical expression is necessary for describing reality. This is due to the possibility of defining indexical expressions of certain type (for example, spatial indexical expressions) with the help of indexical expressions different type (for example, temporal indexical expressions).

The possibility of reducing some indexical expressions to other indexical expressions raises the question whether there is a basic indexical expression, with which it is possible to define every other indexical expression. An example for such a reduction was suggested by Reichenbach, who suggests defining all the indexical expressions with the help of the expression ‘this token.’¹⁸ This expression

¹⁷ Perry, “Frege on Demonstratives,” 486-88; Perry, “The Problem of the Essential Indexical,” 7-8.

¹⁸ Hans Reichenbach, *Elements of Symbolic Logic* (New-York: The Free Press, 1947), 284.

is defined so that each of its tokens refers to itself. This implies that the expression 'this token' is an indexical expression, rather than a demonstrative expression, due to the fact that its reference is independent of the intention of the speaker, or an accompanying act of demonstration, and is determined exclusively by the circumstances of its use.¹⁹ Reichenbach suggests that it is possible to define all the other indexical expressions with the help of this expression. For example, 'I' is defined as 'the person who utters this token,' 'now' is defined as 'the time at which this token is uttered,' and so on.

Reichenbach's suggestion raises several difficulties.²⁰ However, in the present context I wish to point out that Reichenbach's suggestion for the reduction of indexical expressions, and similar attempts, has no implication on the present discussion. What interests me is the possibility of the same proposition being both true and false in different circumstances. My aim is to examine the different indexical expressions in order to determine whether the different features they signify (space, time, and so on) can explain the possibility of the same proposition being both true and false in different circumstances. If Reichenbach's reduction of the indexical expressions is accepted, the question I am asking is simply translated into the question, what feature of tokens (that is, the identity of the subject, spatial position or temporal position) explains the possibility of the same proposition being both true and false in different circumstances; and if more than one feature can explain this possibility, which of these features is more fundamental. It therefore makes not difference for the present purpose whether there is a basic indexical expression, which can be used in order to define all the other indexical expressions.

The conclusion I reach is therefore that a complete reduction of indexical expressions is impossible. This conclusion implies that indexical expressions in general are necessary for describing reality, in the sense that descriptions which can be formulated by means of indexical expressions can not be formulated without the use of indexical expressions. This conclusion is significant for the

¹⁹ In this respect, it is different from the expression 'this,' which Russell uses in an attempt to define all the indexical expressions, whose reference is determined by the attention of the subject (Bertrand Russell, *An Inquiry into Meaning and Truth* (London: George Allen & Unwin, 1940), 108). The expression 'this,' as used by Russell, is therefore a demonstrative expression, rather than an indexical expression.

²⁰ Reichenbach's suggestion can be criticized both on the ground that propositions which include indexical components do not seem to imply the existence of any tokens, and on the ground that this suggestion implies that these propositions are false unless expressed explicitly (see, for example, Richard M. Gale, *The Language of Time* (London: Routledge & Kegan Paul, 1968), 207).

present discussion in two different respects. Firstly, in this discussion I am trying to find a need for propositions which can be both true and false for describing reality. If indexical expressions were reducible to expressions which do not include them, the conclusion would follow that there is no need for propositions which can be both true and false for describing reality. Secondly, the conclusion that a complete reduction of indexical expressions is impossible implies, according to the criterion I devised earlier, that sentences which include indexical expressions express the same proposition in different circumstances.²¹ This is an important step in explaining the possibility of the same proposition being both true and false.

I now turn to the different indexical expressions. First I examine whether each indexical expression actually allows the same proposition to be both true and false. For the present discussion only proves that indexical expressions fulfill one necessary condition for explaining the possibility of the same proposition being both true and false in different circumstances, but not that every indexical expression actually allows the same proposition to be both true and false in different circumstances. Second, I examine whether each indexical expression is necessary for describing reality, or whether it is possible to reduce some indexical expressions to other indexical expressions. Finally, I consider whether describing reality actually requires propositions to be both true and false.

4.

The first indexical expression I examine is the first-person, that is, 'I.' The expression 'I' is an indexical expression, rather than a demonstrative expression, because its reference is independent of the speaker's intention or an accompanying act of demonstration. This is reflected by the fact that a subject who wakes up from a coma suffering from amnesia and says "I feel pain" successfully refers to himself.

How can the indexical expression 'I' enable the same proposition to be both true and false? This is possible only if this expression refers to different subjects. This is the case if the same sentence, for example, (2) "I live in New-York," is expressed by different subjects. Assume that I, who live in New-York, and Dan, who does not live in New-York, both express this sentence. Does this possibility explain the need of propositions which can be both true and false for describing

²¹ As the analysis of the first-person in the next section shows, this conclusion should be restricted to sentences which are expressed by the same subject.

reality? That is, does describing this possibility require the same proposition to be both true and false?

In order to answer this question, we must first address the question of how to describe this possibility. Obviously, the proposition “It is true that ‘I live in New-York’ and false that ‘I live in New-York’” does not correctly describe this possibility, as evident from the fact that it is a straightforward contradiction. In trying to describe this possibility, it must be kept in mind that the reference of the indexical expression ‘I,’ and therefore the truth-value of the proposition which is expressed, is determined according to the identity of the person who utters this expression. The description of the possibility of two different subjects uttering the sentence (2) “I live in New-York” therefore depends on the point of view from which this possibility is described.

Let us consider the proposition Dan expressed. While considering the truth-value of this proposition, I cannot simply ask whether the sentence “I live in New-York” expresses a true proposition, for its truth-value is determined according to where I live, rather than where Dan lives. The sentence I hear Dan utters does not enable me to determine the truth-value of the proposition which he asserts. In order to determine the truth-value of this proposition, I must translate the sentence he utters.²² In light of the fact that in order to determine the truth-value of the proposition which is asserted I must identify the person who utters the sentence “I live in New-York,” it seems that the correct way to translate the sentence I hear is by adding an expression which describes the person who utters this sentence. For example, a simple translation of the sentence Dan utters is “It is true in relation to Dan that ‘I live in New-York’.” Thus, by examining the truth-value of this sentence, I am able to determine the truth-value of the proposition Dan Asserts. This sentence, however, is synonymous with the sentence “Dan lives in New-York,” as evident from the fact that it is impossible for whoever understands them to accept one proposition while rejecting the other. This implies that I must use a proposition which is different from the proposition Dan expressed, in order to understand his assertion.²³

²² For a similar claim, see: Hector-Neri Castaneda, “‘He’: A Study in the Logic of Self-Consciousness,” *Ratio* 8 (1966): 145.

²³ Frege makes a related claim (although for different reasons), according to which a first-person thought of any subject cannot be thought by any other subject (Frege, “Logical Investigations: Thoughts,” 358-59 [65-66]). I should point out that Perry's criticism on this conclusion is mainly directed against its coherence in the confines of Frege's conception of language, and especially in light of Frege's conception of sense, and therefore is irrelevant for the present discussion (Perry, “Frege on Demonstratives,” 488-91). For criticism of Perry and his interpretation of Frege's conception of sense, see: Evans, “Understanding Demonstratives,” 88-91.

I should point out that the synonymy of the sentences “It is true in relation to Dan that ‘I live in New-York’” and “Dan lives in New-York” does not contradict the conclusion of the previous section, according to which indexical expressions are irreducible to expressions which do not include indexical expressions. For the expression ‘I,’ in the sentence “It is true in relation to Dan that ‘I live in New-York,’” does not function as an indexical expression. In fact, the synonymy of the sentences “It is true in relation to Dan that ‘I live in New-York’” and “Dan lives in New-York” indicates that the expression ‘I’ does not function as an indexical expression in the sentence “It is true in relation to Dan that ‘I live in New-York.’” This is evident from the fact that, in contrast to the function of the indexical expression ‘I,’ this expression does not refer to the subject who utters it, and is altogether independent from the circumstances of its use. The expression ‘I’ functions in this sentence as a variable, which stands in place of the expression ‘Dan,’ which precedes it.

Turning back to the description of the situation in which two subjects utter the sentence “I live in New-York,” it is now clear that this possibility is described differently from different points of view. From my point of view, this possibility is described as “It is true that ‘I live in New-York’ and false in relation to Dan that ‘I live in New-York,’” or simply “It is true that ‘I live in New-York’ and false that ‘Dan lives in New-York.’” The last formulation is especially important, because it makes it clear that describing this situation does not require the same proposition, that is, “I live in New-York,” to be both true and false. In fact, even if in my conceptual scheme the proposition “I live in New-York” had been a necessary truth, this description would have been consistent in my conceptual scheme. Furthermore, it is clear that describing this possibility, from any point of view, does not require the same proposition to be both true and false. For the indexical expression ‘I’ refers to different subjects only when expressed from different points of view, while describing this possibility requires choosing a particular point of view from which it is described (including the point of view from nowhere). It can therefore be concluded that the indexical expression ‘I’ does not enable the same proposition to receive different truth-values, and therefore cannot explain why contingent propositions are needed for describing reality.

5.

In this section I turn to the indexical expression ‘here.’ The reason I focus on this spatial indexical expression is that it is generally agreed that the spatial indexical expressions do not signify any objective features of reality, but merely a relation to the subject who utters them. This implies that the spatial indexical expression

'here,' which refers to the spatial position of the subject, is the basic spatial indexical expression, which can be used to define all the other spatial indexical expressions.

Consider sentence (3), "Dan lives here," which I remind you should be understood as tenseless, that is, as "Dan lived, lives, or will live here."²⁴ In light of the fact that the spatial indexical expression 'here' merely refers to the spatial position of the subject who utters this expression, and does not signify an objective feature of reality, this sentence must be uttered in different locations in order to express propositions whose truth-values differ. A change in the truth-value of the proposition expressed by this sentence therefore indicates a change in the location of the subject who utters this sentence.²⁵ For example, suppose that the subject first utters this sentence where Dan does not live, for example, in New-York, and latter utters this sentence where Dan lives. This possibility is described (where Dan lives) by the following proposition:

(3a). It is true that "Dan lives here," but it was false (in New-York) that "Dan lives here."

Proposition (3a) describes the change in the truth-value of the proposition "Dan lives here." This proposition implies that the proposition "Dan lives here" was false in the past, and that it is now true. Notice that the second conjunct in sentence (3a), that is, "it was false (in New-York) that 'Dan lives here,'" is not synonymous with the sentence "it was false that 'Dan lives in New-York.'" That is, sentence (3a) is not synonymous with sentence (3b):

(3b). It is true that "Dan lives here," but it was false that "Dan lives in New-York."

For although proposition (3a) implies proposition (3b), the contrary does not hold. This is due to the fact that the latter proposition does not imply that the subject was ever in New-York, while the former proposition does imply that the subject was in New-York in the past.²⁶ This implies that the expression 'here,' in the sentence "it was false (in New-York) that 'Dan lives here,'" does function as an indexical expression, and is essential to the description of this possibility (in

²⁴ This lets me focus on the spatial indexical component of this sentence.

²⁵ The possibility of this sentence being expressed by different subjects is dealt with in the previous section.

²⁶ In fact, the former proposition implies that any subject, rather than the subject who utters this sentence, was in New-York. However, in light of the conclusions of the previous section, I ignore the possibility of different subjects who utter the sentence "Dan lives here."

contrast to the expression 'I' in the sentence "It is true in relation to Dan that 'I live in New-York'").

Proposition (3a) therefore not only assumes that the proposition "Dan lives here" can be both true and false, but that this proposition was actually false in the past and is actually true now. If the proposition "Dan lives here" could not have been both true and false, that is, if this proposition would not have been a contingent proposition, proposition (3a) would have been a contradiction. It can therefore be concluded that the possibility described by proposition (3a) could only have been described if the same proposition could be both true and false. Thus, this possibility explains why contingent propositions are needed for describing reality.

However, before it can be concluded that the spatial indexical expression 'here' holds the key to the need for contingent propositions, one more issue needs to be addressed. As I previously explained, proposition (3a) assumes a change in time. That is, it supposes that the sentence "Dan lives here" was expressed by the same subject at two different locations, and this is possible only if the subject changed its position in time. This raises the suspicion that it is the temporal component of this proposition which explains its possibility to be both true and false in different circumstances. Furthermore, this dependence is general, and is not limited to sentence (3a). The possibility of the same proposition, which includes a spatial indexical component, being both true and false in different circumstances assumes a change in time. This is due to the fact that a spatial indexical expression, for example, 'here,' cannot refer to different locations at the same time while being used by the same subject.²⁷ Thus, any difference in the reference of a spatial indexical expression (used by the same subject) assumes a change in time.

It might be objected that a difference in the reference of the spatial indexical expression 'here,' as used by one subject, does not assume a change in time. Gale, for example, suggests that someone can simultaneously utter two different tokens of 'here,' which refer to different places, by holding up cards with 'here' inscribed on them, one in each hand.²⁸ This suggestion, however, confuses the use of 'here' as a demonstrative expression and its use as an indexical expression. As a demonstrative expression, the word 'here' can refer to different places simultaneously, depending on the intention of the subject or the act of demonstration which accompanies its expression. However, as an indexical

²⁷ Again, the present discussion is limited to the case in which only one subject utters the same sentence.

²⁸ Richard M. Gale, "'Here' and 'Now,'" *Monist* 53 (1969): 407.

expression, which is the use of this expression which is currently under consideration, the word 'here' cannot denote different places simultaneously, and refers exclusively to the location of the subject who utters this expression.

It can therefore be concluded that any difference in the reference of a spatial indexical expression assumes a change in time. This implies that it is the temporal component of proposition (3a) which explains the possibility of the same proposition being both true and false in different circumstances. I should mention that the conclusion of section 3 is that a complete reduction of indexical expressions is impossible, but not that indexical expressions cannot be defined with the help of other indexical expressions. This is the case with the spatial indexical expression 'here,' which can be defined with the help of the temporal indexical expression 'now' (and the first-person), as: 'the location I am in now.' Notice that it is impossible to use the spatial indexical expression 'here' in order to define the temporal indexical expression 'now.' The expression 'now' is not synonymous with 'the time I am here,' because I can be in the same location at different times.²⁹ This implies that the temporal indexical expression 'now' is more basic than the spatial indexical expression 'here.'

Furthermore, not only can the spatial indexical expression 'here' be defined with the use of the temporal indexical expression 'now,' it can be shown that the spatial indexical 'here' *assumes* the temporal indexical 'now.' One might have thought that though the spatial indexical expression 'here' can be reduced to the temporal indexical expression 'now,' this possibility is not available in conceptual schemes which do not include the temporal indexical expression 'now.' It can be proved, however, that the spatial indexical expression 'here' implies the temporal indexical expression 'now,' and therefore any conceptual scheme which includes the former expression must also include the latter expression: To begin with, it should be noted that the spatial indexical 'here' must include a temporal determination. For the subject is located in different places at different times, while the spatial indexical 'here' refers to a unique position in space, that is, the current location of the subject. This implies that the spatial indexical 'here' includes a temporal determination. Additionally, the temporal determination

²⁹ This marks an important disanalogy between time and space. This disanalogy follows from the fact that any difference in the reference of indexical expressions, whether temporal or spatial, assumes that they are uttered at different times, but not that they are uttered in different places (assuming they are uttered by the same subject). This disanalogy was recognized before in different terms by several philosophers, for example, see Clyde L. Hardin, "Thank Goodness It's Over There!," *Philosophy* 59 (1984): 122; David H. Mellor, *Real Time II* (London: Routledge, 1998), 95-96; and Yuval Dolev, "Space and Time: Some (dis)Analogies," *Iyyun* 49 (2000): 70.

which is included in the spatial indexical 'here' must be a temporal indexical (that is, 'now'). For, any other possibility would imply the possibility of reducing the spatial indexical expression 'here' to an expression which does not include any indexical expressions. As section 3 proves, however, this is impossible. It can therefore be concluded that the spatial indexical 'here' not only can be reduced to, but actually assumes, the temporal indexical 'now.'

The conclusion of this section is therefore that the spatial indexical expression 'here' does enable the same proposition to be both true and false in different circumstances. However, my analysis shows that the spatial indexical 'here' assumes, and can be reduced to, the temporal indexical 'now.' This implies that the explanation of how the same proposition can be both true and false in different circumstances is explained by the temporal indexical component of this proposition, rather than its spatial component. This conclusion leads me to the examination of the temporal indexical expressions.

6.

The first question that should be addressed, in light of the wide selection of indexical expressions available (for example, past, present (now), future, yesterday, tomorrow and so on), is which of these expressions, if any, is the basic temporal indexical expression. The answer is that the temporal indexical expression 'now' (or 'present') is the basic temporal indexical expression, which is necessarily included in any conceptual scheme that includes temporal indexical expressions. This is evident from the fact that propositions which include a temporal indexical component describe reality from a point of view which is located at the present (that is, 'now'). This claim is proved by the following consideration: For every sentence *p*, which includes a temporal indexical expression, adding the prefix 'now' results in a proposition which has the same truth-value as the original proposition. For example, "I was in New-York yesterday" has the same truth-value as "Now (it is true that) 'I was at New-York yesterday'."³⁰ This implies that temporal indexical expressions assume the existence of a unique position in time, denoted by the indexical expression 'now,' in relation to which their reference is determined. It therefore follows that every conceptual scheme that includes temporal indexical expressions must include the temporal indexical 'now' (or 'present'). In light of this conclusion, I concentrate in what follows on the temporal indexical expression 'now.'

³⁰ In contrast, for example, to the proposition "Yesterday (it was true that) 'I was at New-York yesterday'."

Consider sentence (4): “There is no university in New-York now.” Its suggestion that the same proposition can be both true and false at different times is expressed, for example, by the following sentence:

(4a). It is false that “There is no university in New-York now,” but in 1492 it was true that “There is no university in New-York now.”

Proposition (4a) describes reality from a point in time (that is, now) in which there is a university in New-York, but it claims that in the past (that is, in 1492) the proposition “There is no university in New-York now” was true. Proposition (4a) therefore not only assumes the possibility of the same proposition being both true and false in different circumstances, but actually implies that the same proposition, that is, “There is no university in New-York now” has different truth-values at different times.

The analysis of the temporal indexical expressions raises a complication which does not exist in the case of spatial indexical expressions. For while it is generally agreed that spatial indexical expressions are subjective, in the sense that their reference is determined in relation to the position of the subject, rather than by an objective feature of reality, the same does not hold with regard to the temporal indexical expressions. The status of the temporal indexical expressions is under controversy. According to supporters of the B-theory of time (the detensers), the temporal indexical expressions are analogical to the spatial indexical expressions, and similarly their reference is determined in relation to the time in which they are used by the subject. According to the supporters of the A-theory of time (the tensors), on the other hand, the temporal indexical expressions signify objective features of reality, and the change in the A-determinations of past, present, and future is an essential feature of time, which explains why time (rather than space) is the dimension of change. This controversy has significant implications. However, as I explain next, it is irrelevant for the present discussion.

According to the B-theory of time, which holds that the spatial indexical expressions are analogical to the temporal indexical expressions, proposition (4a) not only claims that in 1492 there was no university in New-York, but also that the subject who utters that sentence was present at that time.³¹ For according to this conception of time, being ‘now’ is not an objective feature of reality, but merely a relation of simultaneity to the utterance of the temporal indexical

³¹ There may have been other subjects at that time. However, I remind you that, in light of the analysis of the first-person, I am currently limiting the discussion to the case in which the same subject utters the sentence “There is no university in New-York now.”

expression 'now' by the subject. This is the reason why sentence (4a) is not synonymous with sentence (4b):

(4b). It is false that "There is no university in New-York now," but true that "There was no university in New-York at 1492."

For although proposition (4a) implies proposition (4b), the contrary does not hold: It is possible both that there was no university in New-York in 1492, and that the proposition "There is no university in New-York now" was never true – simply because the subject who utters this sentence never existed at the time in which there was no university in New-York. Thus, the fact that sentences (4a) and (4b) are not synonymous implies that describing this possibility necessitates the same proposition to actually be both true and false at different times.

According to the A-theory of time, on the other hand, sentences (4a) and (4b) are synonymous. This may give rise to the claim that describing this possibility does not require the same proposition to be both true and false. For proposition (4b) seems to show that, in order to describe the possibility described by proposition (4a), there is no need in the same proposition being both true and false. However, according to the A-theory of time, sentence (4a) reflects the correct analysis of proposition (4b). For, according to this conception of time, the change in the temporal A-determinations of past, present (now), and future is essential for time. This conception of time therefore implies that the proposition "There is no university in New-York now," which is now false, was true in the past.

It can thus be concluded that the need for propositions which are both true and false in different circumstances, and therefore the need for contingent propositions in describing reality, is found in describing the change in the A-determinations of past, present, and future. As I have explained, it makes no difference whether the temporal A-determinations are objective, or whether they are subjective. Even in the latter case, in which the change in the temporal A-determinations is merely the result of describing reality from a subjective point of view, describing this change still requires the use of contingent propositions.

7.

The previous analysis has revealed that the one and only feature of reality whose description requires the same proposition to be both true and false is the change in the temporal A-determinations. This feature of reality can only be described by the use of propositions which include temporal indexical expressions, which are both true and false at different times. As I explained, this conclusion is independent of the question whether the temporal A-determinations signify an

objective feature of reality, or whether they are merely subjective, and merely describe a relation to the subject.

In section 2 I argue that the need for contingent propositions for describing reality can be explained only by the need for propositions which can actually be both true and false. It can therefore be concluded that the need for contingent propositions in describing reality is explained by the change in the temporal A-determinations. Thus, although not every contingent proposition in language is tensed, my conclusion I reach implies, in accordance with what I suggest in section 2, that contingent propositions whose truth-value is absolute are defined with the help of propositions which include a temporal indexical component.

The conclusion of this article is that the change in the temporal A-determinations explains the need for contingent propositions for describing reality. This answers the question which I introduced at the beginning of the article, regarding the explanation of the difference between the different fields of discourse, the contingent and the necessary. My conclusion suggests that the explanation for why contingent propositions are needed for describing the physical reality, and are absent in mathematics and logic, lies in time, and more specifically, in the change in the temporal A-determinations.