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Conditionals from a Linguistic Point of View: Two Case Studies

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1 Introduction

The meaning of conditional sentences bears an intrinsic relation to a number of central philosophical problems, like the nature of reasoning, the possibility of knowledge, and the status of laws of nature. This has incited philosophers to spend a lot of time working on conditionals and to fill countless bookshelves with inspiring and sophisticated theories on their meaning. However, the overall question of how to approach the meaning of conditionals is still open. There are many different theories on the market, many central issues still need to be solved.

But as a topic philosophers are interested in conditionals are special in that they are *real*; they can be the subject of empirical investigations. And they are actually investigated – in linguistic, in psychology, in the cognitive sciences. The goal of this paper is to illustrate how this ‘external’ information can be used to answer questions on the semantics of conditional sentences that philosophers and logicians are interested in. The focus will lie here on using linguistics information.

In order to make this point we will concentrate on two open problems in the field. The first problem is the relation between the logical form often assumed for conditional sentence and the *actual* form of these sentences. We will argue based on linguistic observations that the expression $A > C$ standardly used in the philosophical

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literature to formalize conditionals is not appropriate and discuss an alternative, analyzing the antecedent as a referential expression.

The second case discussed here is the distinction between indicative and subjunctive conditionals. The standard view in the philosophical literature is that indicative and subjunctive conditionals are two essentially different types of conditionals. We will argue, starting from how the distinction between indicative and subjunctive conditionals is normally marked, that there is only one conditional. The observed differences in meaning will be explained assuming different presuppositions for both types of clauses.

2 First Case Study: The Logical Form of Conditional Sentences

The logical form typically assigned to conditionals in the philosophical literature is $A > C$. In this formal expression A is normally taken to represent the antecedent, C the consequent, and given the need to locate the binary connective $>$, the natural candidate seems to be *if*. But linking the form $A > C$ in this way to real conditional sentences is for a couple of linguistic reasons not convincing.

First of all, the syntax of conditionals clearly differs from the syntax of complex sentences formed using coordinators like *and* and *or*. Conditionals are no coordinated clauses, but subordinated-main clause constructions. The antecedent and consequent are, thus, syntactically no equals. Syntactically, *if* clauses are adverbial clauses. They function as adjunct clauses, expressing a modifier, not an argument. One might want to counter that this doesn't need to bother philosophers interested in conditionals, because the overall meaning our theories ascribe to the expression $A > C$ might still be the meaning of the corresponding conditional. We just derived it in a different way. But at least it shows that the way the meaning of a structure like $A > C$ is composed has to differ from the way it is composed in real conditional sentences.

That there are also serious problems with analyzing *if* as conditional connective has been already discussed in the philosophical literature. For instance, interpreting *if* as conditional connective makes it very hard to account for the meaning of conditionals with quantificational elements like in (1) (see [13] and [11]).¹

(1) Normally, if I'm late, the train is late, too.

But there are also a number of linguistic observations making the same point. For instance, *if* is not an obligatory element of conditional sentences, not in English and generally also not in other languages. This is hard to explain if *if* is taken to express the conditional connective. Or, to give just one other argument, many languages that have an *if*-like expression use temporal *wh*-pronouns or interrogative complementizers in this function. This is also the case for English, as can be seen in (2-a). Bulgarian uses a question marker (*li*) to indicate antecedents of conditionals, as illustrated in (2-b) [4].

¹There is a way out of this problem using three-valued logic for the binary connective [3]. This route has been recently explored in some detail in [8].

- (2) a. Peter wondered if Sue called the doctor.
 b. Znae li anglijski, ste go vzemat na rabota.
 know-3sg Q English, will him take to work.
 c. If he know English, he will find work.

So, the *ifs* have also other uses in many languages. If we want to interpret *if* as a conditional connective in conditional sentences, we have to have some other story for these other uses, because in them *if* clearly does not express a conditional connective. Of course, we could assume an ambiguity. But then it will be hard to explain the cross-linguistic pattern: if *if* in conditionals means something completely different from what it means in question contexts, why do we have systematically the same expressions in both environments?

We conclude that it is not convincing to assume that *if* corresponds to the conditional connective of the logical expression $A > C$. But how, then, is the operator $>$ expressed in conditional sentences? And what does *if* do if not expressing $>$? This gives us a glimpse of a more general problem underlying the philosophical approaches to conditionals. We (as philosophers) claim that the meaning our theories predict for the expression $A > C$ is the meaning of the corresponding real conditional. But we have seen in the last paragraphs that we run in all kinds of trouble when trying to define the underlying correspondence relation. This seriously threatens the plausibility of our theories. The rest of this section will be devoted to find a more appropriate logical form for conditional sentence. We will do so starting from the vantage point that holds the most promise for success: the actual form of conditionals.

The first thing that catches the eye about *if*-clauses, when we approach them from a linguistic point of view, is that they behave like referential expressions [6, 14]: they can appear in left-dislocated positions, they display condition C effects, and they allow for resumptive pronouns.² This suggests that the semantics of *if*-clauses should be strongly related to the semantics of referential expressions. A popular proposal following this idea is to analyze *if*-clauses as a definite description of possible worlds, taking *if* to be the definite article [14]. Analyzing *if* clauses as referential expressions, more specifically definite descriptions, suggests a different logical form for them. Let p be the proposition expressed by the antecedent, and q the proposition expressed by the consequent, the semantics of conditionals can then be paraphrased as *The p -worlds are q -worlds*, suggesting a logical form like (3-a) where the consequent proposition is simply predicated of *the* antecedent-world(s).^{3,4} Alternatively, we could adopt the restrictor approach of [11] and propose that the referent introduced by the *if*-clause is picked up by a modal in the consequent to function as its restrictor [5].⁵ In this case the logical form of conditionals looks rather like (3-b), with Q being a quantifier over possible worlds.

²For a more detailed discussion of these observations see [14], and for some more examples see [6].

³We assume here a Strawsonian approach to definite descriptions.

⁴To prevent unnecessary complications the logical form given here assumes that the antecedent refers to one single possible world. We could as well work with plural definite descriptions here, but it would involve introducing technical tools that only distract from the main line of argument.

⁵Following this line of approach we need to assume that there is always a modal present in the consequent of conditionals.

- (3) a. $q(\iota w.p(w))$
 b. $Q(\iota w.p(w))(q)$

Assuming the *if*-clause to be a referential expression still combines easily with a lot of philosophical work on conditionals. For instance, it works nicely together with the similarity approach [12, 16]. According to this approach a conditional is true in a world w_0 if the proposition expressed by the consequent is true in the world(s) making the antecedent proposition true that are most similar to the evaluation world w_0 . Let $Sim_{\leq}(w_0, A)$ be the (set of) A -world(s) most similar to w_0 . We can now easily combine the similarity approach with the analyses sketched in (3) by either adding the similarity function to the meaning of the referential antecedent (in this case (3-a) would become $q(\iota w.w = Sim_{\leq}(w_0, p))^6$), or we could add it to the semantics of the quantifier in (3-b) [5].

Given that the similarity approach has also been used to spell out the truth conditions of $A > C$, we might wonder what exactly the relation is between this approach and the referential approach sketched above. Both approaches certainly agree in the overall semantics they assign to conditionals. But they differ in the distribution of work over the components of the formal expression. In case of the logical form $A > C$ all the work is done by the conditional connective. In case of the referential approach we see a division of work: part is done by the referential antecedent (selecting a relevant set of antecedent worlds), part by the consequent (quantifying over this set).⁷

But if it is just a question of distributing the same semantics over different syntactic constructions, what is the relevance of such an enterprise to scholars that are only interested in the overall semantics of conditionals? First of all, by using a logical form that is derived from the actual form of conditionals we solve the correspondence problem we discussed above. With the referential approach, which is well-related to the actual form conditionals take, we can honestly claim that our semantic theory is indeed about conditional sentences. So, in this case taking a linguistic perspective on conditionals doesn't so much change our philosophical theory, but it puts it on more solid grounds.

But there is more to it. Different logical forms make different predictions for the interaction with other logical operators. The latter is a topic that philosophers and logicians are very interested in. A simple example is the interaction of conditionals with negation. While we can have constructions like "*It is not true that ...*" the natural way to negate sentences in English is to have *not* after the finite verb of the main clause ((4-b) as the negation of (4-a)).

- (4) a. If Tim had been in time, he would have met Lisa.
 b. If Tim had been in time, he would not have met Lisa.

The natural way to interpret (4-b) is to take only the consequent to be negated, not the conditional as a whole. If one works with $A > C$ as the logical form of

⁶Again, for reasons of convenience we assume in the formalization that there is one single most similar world.

⁷If we assume that the antecedent refers to a plurality of worlds, then in case of (3-a) the universal quantification is done by the distributivity operation needed to predicate over pluralities of worlds.

conditionals, this is confusing, because based on this form one can distinguish two positions for negation: wide-scope negation ($\neg(A > C)$) and narrow-scope negation ($A > \neg C$). The problem disappears immediately if one works with (3-a) as the logical form of conditionals: in this case there is only one place for the negation.^{8,9}

We finish this section with a different kind of example for how analyzing the antecedent of conditionals as referential expressions can help to solve philosophical debates on the semantics for conditionals. For this we turn back to the similarity approach. As has been already discussed in [12] this approach appears to make wrong predictions in case there exist(s) no world(s) most similar to w . Such conditionals would come out as trivially true. This problem is standardly approached changing the definition of the truth conditions of conditionals following a proposal of [12]. However, this approach has much less attractive logical properties. Therefore, when working with the similarity approach it is often simply assumed that the most similar worlds exist (in the literature, this is referred to as *making the limit assumption*). The question is whether it is legitimate to make this assumption. [12] has argued that no, we cannot make the limit assumption, because there are conditionals for which this assumption makes wrong predictions. However, his examples have been criticized (see, for instance, [14]). The referential analysis of antecedents provides a new perspective on this problem. For referential expressions it is standardly assumed that they presuppose the existence of the entity they refer to. From this perspective, the conditional itself is making the limit assumption. The *if*-clause can only refer to the set of antecedent worlds most similar to the evaluation world, if this set is non-empty. The theory developed in [12], on the other hand, has a hard time explaining why *if*-clauses behave like referential expressions. According to this proposal there are no entities the semantic analysis of the antecedent assumes to exist.

3 Second Case Study: Indicative vs. Subjunctive Conditionals

We come now to our second case study of how linguistic considerations can help when approaching the semantics of conditionals. It concerns the difference in meaning between indicative and subjunctive conditionals. In English the difference between these two types of sentences shows up in the morphology of the finite verb. The finite verb in the antecedent and the consequent of a subjunctive conditional is marked for the Simple Past. Furthermore, in English subjunctive conditionals the finite verb in the consequent is a modal verb (*would, should, might, ...*) (see (5-a)). In

⁸Here it is important that we assume a Strawsonian approach to definite descriptions and not Russell's analysis.

⁹It might be surprising that the choice of logical form matters so much even if the semantics attributed to the different forms is the same, and, hence, the assigned meaning combines the same semantic operations. But for the interaction with other operators like negation it really matters which of these operations are present in the logical form. In the plural variant of (3-a) the universal quantification over all antecedent worlds most similar to the evaluation world is done by a distributivity operation. This distributivity is NOT expressed but is part of the interpretation rule of plural predication. Hence, a negation expressed in the consequence cannot have narrow scope with respect to this operation.

indicative conditionals we don't find these past-tensed modals in the consequent (see (5-b) and (5-c)).

- (5) a. If Peter left in time, he would be in Amsterdam this evening.
 b. If Peter left in time, he will be in Amsterdam this evening.
 c. If Peter left in time, he caught his train.

The main question that needs to be answered now is whether it is possible to give a uniform approach covering the semantics of indicative as well as subjunctive conditionals. So far, the jury still seems to be out on the answer, though there is in the philosophical literature a clear dominance of proposals that claim that we need a significantly different semantics for indicative and subjunctive conditionals: "... *they are logically distinct species.*" [1]; "*Therefore there really are two different sorts of conditional; not a single conditional that can appear as indicative or as counterfactual depending on the speaker's opinion about the truth of the antecedent.*" [12].

There are basically two types of arguments brought forward to support this thesis. The first argument consists of example-contexts where apparently the indicative and the subjunctive version of the same conditional give raise to different truth/acceptability conditions.¹⁰ The most famous example is the 'Kennedy' example discussed in [1]. A related example is the following from [19].

The duchess has been murdered, and you are supposed to find the murderer. At some point only the butler and the gardener are left as suspects. At this point you believe

- (6) If the butler did not kill her, the gardener did.

Still, somewhat later after you found out convincing evidence showing that the butler did it, and that the gardener had nothing to do with it you get in a state, in which you will reject the sentence

- (7) If the butler had not killed her, the gardener would have.

Next to these empirical arguments, the other main argument is an appeal to our intuitions that indeed we do interpret these conditionals differently. Basically we observe two different readings for conditionals. For one thing, there is an epistemic reading, which uses our accidental knowledge/beliefs about the world when checking whether the consequent of the conditional follows from the antecedent. And then there is a metaphysical/ontic reading, which is not about what could I derive from learning that *A* is true, but rather about what would the world be like if *A* was brought about. According to this argument we observe that the epistemic reading is normally associated with indicative conditionals, while the metaphysical/ontic reading is associated with subjunctive conditionals. From this it is concluded that, the different moods express these two different readings.

¹⁰This difference is meant to go beyond the difference in the attitude of the speaker towards the antecedent.

Based on these arguments it seems that yes, we need to define significantly different semantics for indicative and subjunctive conditionals. However, there are a number of problems with this type of approach to the indicative/subjunctive distinction. For instance, the theory has difficulties to explain why in most cases indicatives can be translated into subjunctives just fine (see example (8)). The only difference seems to be the attitude of the speaker towards the antecedent.

- (8) a. If you ask Simon, he will help you.
 b. If you asked Simon, he would help you.

A second problem is that the strict correspondence between form (indicative or subjunctive conditionals) and reading proposed by this line of approach seems not to be working. There are indicative conditionals that have a metaphysical/ontic readings, in particular indicative conditionals about the future. Finally, from a linguistic point of view the approach is not convincing. The form of both types of conditionals is so strongly related that it is very hard to see how they can express two completely different types of reasoning. Thus, theories proposing a substantial semantic difference between indicative and subjunctive conditionals run in danger to not fit into a general theory of grammar.

We conclude that the thesis that indicatives and subjunctives are “logically distinct species” has to face some serious challenges. But the alternative, proposing a unified approach to both types of conditionals is also not without problems, because it still needs to explain all the observations that motivated the “two different operators” thesis. How can we solve this conflict? Following the general line of the present paper, we will now try to find an answer to this question focussing on how the difference between indicative and subjunctive conditionals is normally expressed in the languages of the world.

It turns out that in many languages this is done by temporal or temporal-aspectual morphology. This is, for instance, clearly visible in English. Subjunctive conditionals differ from indicative conditionals (besides the modal element in the consequent) in the obligatorily past tense morphology in antecedent and consequent. This morphology doesn't seem to have a temporal function in this context. The antecedent of the subjunctive conditional (5-a) – which is identical to the antecedent of the indicative (5-b) – cannot be interpreted as referring to a past event. Linguists call this *fake tense* [9]. Fake Tense does not only occur in conditional sentences, and has been reported for various languages from different language families [10]. This seems to suggest that there is a strong relation between the semantic function of tense markers and mood markers. This relation, or similarity, is then responsible for the cross-linguistic tendency to use temporal markers also to express the distinction between the indicative and the subjunctive mood. So, in order to understand the semantics of the mood it might help to take a look at the semantics of the tenses.

It is standardly assumed that tense positions eventualities relative to the temporal deictic center, i.e. the utterance time. The Simple Past marks distance from this deictic center, while the Present Tense expresses location at (or in the future of¹¹) the

¹¹This depends on the language.

temporal deictic center. A simple way to spell this out is given in (9). In this formalization tensed clauses denote properties of times t and come with a presupposition (first part after the lambda expression) that locates the temporal variable relative to the time of speech s .

- (9) a. Simple Past(P): $\lambda t \lambda w. t < s. P(t)(w)$
 b. Simple Present(P): $\lambda t \lambda w. t \geq s. P(t)(w)$

Maybe the moods are also about locating eventualities relative to some deictic center. But now this center is no longer a temporal center, but a modal center. We take the modal center to be the epistemic center of the speaker, i.e. the set E of worlds making all of the speakers beliefs and expectations true. Now, we could say that the indicative presupposes that we are talking about worlds within the epistemic center of the speaker, while the subjunctive mode demands distance from this deictic center. This idea has been roughly spelled out in (10).

- (10) a. Subjunctive(p): $\lambda w. w \notin E. p(w)$
 b. Indicative(p): $\lambda w. w \in E. p(w)$

This analysis can be combined with the referential approach to *if*-clauses we discussed in the first case study. According to this approach the *if*-clause is taken to refer to the set¹² of worlds making the antecedent proposition true that are most similar to the evaluation world. Now, the antecedent proposition is taken to be of the form given in (10). The antecedent of an indicative conditional would refer, for instance, to a set $Sim_{\leq}(w_0, \lambda w. w \in E. p(w))$.¹³ Notice the particular role the mood presupposition plays in the antecedent. Because the presupposition is attached to the proposition the similarity function takes as an argument, the presupposition ends up being an additional restriction on the set of worlds the antecedent refers to. An indicative antecedent, for instance, does not *presuppose* that its referent is a subset of E . Instead, the referent is *constructed* as containing only worlds that are elements of E . The antecedent *does* presuppose – by its referentiality – that there are such worlds, hence, that some of the antecedent worlds most similar to w_0 are elements of E . In other words, the antecedent presupposes that the set of worlds it refers to is consistent with the expectations of the speaker – which is intuitively correct. In this respect the approach proposed here differs, on the one hand, from [17] who proposes (using our terminology) that for indicative conditionals the referent of the antecedent is an element of E , and, on the other hand, from approaches like [7, 18] who suggest that for indicatives the set E restricts the antecedent worlds among which the similarity function selects most similar worlds.

The last ingredient our proposal needs is a particular spell out of the similarity approach. We follow here [15, 19] for the details of the similarity function, because this line of approach is very successful in accounting for the ontic/metaphysical read-

¹²For reasons of convenience we assume from now on that the antecedent refers to a set of worlds instead of a single world.

¹³We leave it open how the referentiality of *if*-clauses is derived compositionally. It can be done by interpreting *if* as definite article.

ing of conditionals. Most importantly, according to these approaches the similarity function focusses on two aspects of the evaluation world w_0 when selecting closest worlds: (i) the regularities/laws we assume to govern w_0 (f.i. causal dependencies), and (ii) those singular facts of w_0 that are independent of the truth of the antecedent given the laws/regularities.¹⁴

Focussing on the linguistic differences between indicative and subjunctive conditionals we just developed an approach that proposes a uniform interpretation rule for both conditionals. They only differ with respect their presuppositions. This raises the question whether the approach can deal with the arguments against a uniform interpretation that we discussed earlier. One of the arguments was that there is a clear intuitive difference between the interpretation of indicative and subjunctive conditionals: in the first case we observe an epistemic reading, in the second case a metaphysical/ontic reading. The proposal made here can account for these intuitions. Take, for instance, example (6). The speaker believes that $A \vee B$, where A stands for *The butler murdered the duchess* and B stands for *The gardener murdered the duchess*. Hence, $A \vee B$ is true in all worlds of E . Now we want to evaluate the indicative conditional with antecedent $\neg A$ and consequent B . The present proposal predicts that antecedent refers to the set of worlds in E that make the antecedent $\neg A$ true and are most similar to the evaluation world. Because it is a subset of E also $A \vee B$ is true in all of its members. But from this it follows that also B has to be true in this set. Hence, the conditional (6) comes out as true, as intended. The subjunctive conditional with antecedent $\neg A$ and consequent B comes out as false, because in this case we cannot conclude that in all worlds selected by the antecedent $A \vee B$ is true.

The example illustrated nicely how the proposal accounts for the epistemic flavor of indicative conditionals. The presence of the indicative mood demands that the worlds the antecedent refers to are worlds validating all the speaker's beliefs and expectations. Thus, in this case on top of the information provided by the similarity function all the epistemic information of the speaker can be used to derive the consequent from the antecedent. For subjunctive conditionals the epistemic information of the speaker is not available. All that remains to link the antecedent to the consequent is the similarity function. The way we specified this function here it gives us a metaphysical/ontic reading.

Though we can't go into the details here, this approach can also account for examples like [1]'s Kennedy example. Especially for Adam's example it is crucial that given the way the referential and the mood presupposition in the antecedent interact, the present approach does not predict that the distribution of indicative and subjunctive conditionals is complementary. There are contexts where both mood variants of the same conditional can be uttered. These are contexts in which some most similar antecedent worlds are in E and some aren't. Because in this case the consequent of an indicative and a subjunctive conditional are checked in two complementary sets, the truth conditions of both conditionals can indeed differ.

Thus, the linguistically motivated approach to the subjunctive/ indicative distinction defended here can deal with classical examples brought forward to argue

¹⁴Both approaches define this independence differently.

for a serious semantic distinction between both types of conditionals. The present approach does so while still maintaining a unified interpretation rule for subjunctive and indicative conditionals. Consequently, it is not subject to the problems the theories proposing essentially different interpretation rules give rise to. For instance, the present approach fits much better the linguistic form conditionals take cross-linguistically. It can also explain why there is no strict correspondence between the form (mood) and reading (epistemic or metaphysical) of conditionals, or, more concretely, why indicative conditionals do not always give rise to an epistemic reading. The present approach predicts that an epistemic reading only occurs if epistemic information of the speaker/agents is involved in deriving the consequent from the antecedent. Epistemic information about the future, for instance, is rare. This is the reason for why we observe dominantly metaphysical readings of indicative conditionals about the future.

We will finish the paper with the arsenic example from [2]. Discussing the potential causes of the symptoms of a patient one can utter (11-a) even in case the speaker believes that an arsenic poisoning is the actual cause of the symptoms. Though hardly ever mentioned in the literature, there is a related surprising observation: the indicative variant (11-b) is unacceptable in the same context.

- (11) a. If the patient had taken arsenic, she would have shown exactly the symptoms she is showing.
 b. If the patient has taken arsenic, she shows exactly the symptoms she is showing.

Let us have a look at how our proposal can account for both observations. We start with the indicative conditional (11-b). The antecedent is predicted to refer to a subset of E . However, that means that in all of the worlds in this subset the patient has the symptoms the speaker is actually observing (his/her observations feed naturally into E). But this way the consequent is trivially true: we are just comparing the speakers beliefs about the patient's symptoms with the speakers beliefs about the patient's symptoms. Thus, the indicative mood (example (11-b)) is inappropriate, because it renders the conditional trivial.¹⁵

In case of the subjunctive conditional (11-a) the antecedent refers to the set of most similar antecedent worlds outside of E . Even in case the speaker believes the antecedent to be true it is reasonable to assume that such worlds exist. In this set of worlds the patient doesn't have to show the same symptom we observe now. We need to derive the symptoms from the antecedent (that the patient took arsenic) and the mechanics of arsenic poisoning. The way the similarity function is specified here it will take us to worlds where the patient has all the normal symptoms of arsenic poisoning. Now we can non-trivially compare these symptoms with the accidental symptoms we observe in the patient and conclude that they are the same. This matches our intuitions about the meaning of (11-a).

To summarize the discussion in this section, we defended here an approach according to which there is one core interpretation rule for both, indicative as well as

¹⁵This has been already observed in [17].

subjunctive conditionals. The approach proposes that the two types of conditionals only differ with respect to their presuppositions. In case of subjunctive conditionals the presupposition doesn't add anything substantial to the meaning of the conditional. In case of indicative conditionals the presupposition does have a serious effect: indicative conditionals carry on top of the basic interpretation rule non-trivial epistemic implications.

Many of the basic ideas underlying the present proposal are not new, but the particular way these ideas have been spelled out here is original. Central for the message of this paper is that we found this new approach by consequently following the lead of the linguistic properties of indicative and subjunctive conditionals. Besides that the approach is better grounded than others in the form conditionals actually take, this case study also illustrates nicely how a linguistic perspective can inspire new solutions for old problems.

4 Conclusion

The goal of this paper was to argue that it can be extremely useful to take into account a linguistic point of view when approaching conditionals. But the paper gave nothing more than a small glimpse of the possibilities this direction holds. There are many more problems concerning conditionals where a linguistic perspective might help. In fact, the message conveyed should be read more general. There are also various other linguistic expressions that are relevant to certain philosophical discussions. In all of these cases our philosophical debate can only benefit from consulting linguists. Rests me to express my hope that in the future this route will be explored in much more detail.

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