

THE INTERROGATIVE IN A SYNTACTIC FRAMEWORK

INTRODUCTION

The interrogative sentences are so different from others, in form, in meaning, and in their textual neighbors, as to permit a variety of specialized descriptions designed to account for them. In this paper, interrogative sentences will be characterized not by a special description but as a particular case in a general theory that produces and analyzes all sentences of the language. That is to say, we will try to obtain the forms and contextual restrictions of the interrogatives from the syntax of the non-interrogative sentences and discourses, without any special syntactic rules made up only for the interrogatives.¹

It will be found that all interrogative sentences can be derived, by means of the independently established transformations of the language, from sentences which assert that someone is asking about a disjunction of statements which are the relevant possible answers to that interrogative. And it will be found that interrogative words are pronouns for disjunctions of words (in particular, arguments-words; see 5.4) occupying a single position in that disjunction of statements, when the residues of those sentences (i.e. when everything outside that position) are identical. E.g., *Who came?* is a transform of *I ask you whether A came or B came or ... or X came.* In sections 1–4, this analysis is presented for the major interrogative forms. In sections 5–7, many special interrogative forms are explained in these terms.

To begin the analysis, we consider the overt transformations among interrogative forms, and between interrogative and non-interrogative sentences. In so doing, we will use initially a practical criterion for transformations: Let w_1, w_2, \dots, w_n be n word-classes established in the grammar independently of the transformation in question; and let $\{A\}$ be a set of sentences or sentence pairs, and $\{B\}$ a set of sentences, where each member (sentence or sentence-pair) of $\{A\}$ has some ordered n -tuple of values (word-choices) from w_1, w_2, \dots, w_n and each sentence of $\{B\}$ has the same n -tuple of word-choices as some member of $\{A\}$, possibly in different order, and possibly with the words in certain positions having zero form. In addition, all the sentences of $\{B\}$ may differ from all those of $\{A\}$ by locating in among the n -tuple of words a particular morpheme or word-sequence (a “constant”) at a point where the sentences of $\{A\}$ have nothing or have different (“suppletive”) morpheme or word-sequence. A member A_i in $\{A\}$ will be said to

correspond to B_j in $\{B\}$ if A_i and B_j are formed from the same n -tuple of word-choices in the n classes. Among the sentences of $\{A\}$, as among those of $\{B\}$, there are inequalities as to their likelihood of occurrence in discourses of the language (see section 8). If these inequalities among the members of $\{A\}$ are approximately the same as those among the corresponding sentences of $\{B\}$, there is a transformation between the set $\{A\}$ and the set $\{B\}$; and the sentences of A are transforms of the corresponding sentences of $\{B\}$.²

For example, let $\{A\}$ be sentences of the form N_1tVN_2 (with t for tense, and excluding certain sentences such as *He slept an hour* which can be shown to be transformed from a different sentence form), and $\{B\}$ sentences of the form N_2t be *Ven* by N_1 . Here, corresponding sentences are e.g. *John poured milk* and *Milk was poured by John*. The inequalities of likelihood of occurrence as among, e.g. *John poured milk*, *The truck poured sand*, *The truck poured houses*, *The molecule poured mountains*, are approximately preserved as among their corresponding *Milk was poured by John*, *Sand was poured by the truck*, *Houses were poured by the truck*, *Mountains were poured by the molecule*. Also, $\{A\}$ can be the pairs of sentences of the form N_1tV_1N , and $\{B\}$ sentences of the form N_1tV_1N and N — which can be considered to be N_1tV_1N and N_1tV_1N with the second N_1tV_1 having zero form. The inequalities of likelihood of occurrence among, e.g., (1) *John poured milk*, *John poured wine*, (2) *The truck poured sand*, *The truck poured houses*, (3) *The molecule poured houses*, *The molecule poured mountains* are approximately preserved in their corresponding sentences (1') *John poured milk and wine*, (2') *The truck poured sand and houses*, (3') *The molecule poured houses and mountains*. In contrast, the inequalities are not preserved as among sentences of the form N_1tVN_2 and the corresponding sentences of the form N_2tVN_1 : *John poured milk*, *The molecule poured mountains* as against *Milk poured John*, *Mountains poured the molecule*.

Transformations are thus a relation directly between sentences of the language.

The requirement that the word-classes be establishable in the grammar apart from the given transformation precludes the setting up of special transformations for ad hoc and purely semantic subclasses of words. Indeed, it is found that such transformations are not needed, and that any valid transformations applying to ad hoc word-sets can be obtained from general transformations in which the given words call forth — on a priori stateable grounds — specialized zeroings or the like.³

1. YES-NO QUESTIONS

We first consider transformations among the interrogative forms.

The most obvious one is that all yes-no questions can be taken as transforms of the corresponding question with an adjoined constant *or not*, or with *or* plus the question of the negation of the same sentence.

- (1) *Will John stay?*
- (2) *Will John stay, or not?*
- (3) *Will John stay or will John not stay?*

By the transformational criterion given above, these are all transforms of each other, the inequalities in likelihood in respect to word-choices in the tense, subject, and verb positions being the same in all three forms: Compare the good likelihoods of *Did John stay?*, *Will I die?* and lower likelihoods of *Did I die?*, *Did the universe stay?* with the good likelihoods of *Did John stay or not?* *Will I die or not?*, and the lower ones in *Did I die or not?*, *Did the universe stay or not?*

We could say that *or not* in (2) is a zeroable constant in the interrogative form. But all the possible zeroings and pronounings intermediate between (3) and (2) exist also as transforms:

- Will John stay or will John not do so?*
- Will John stay or will he not do so?*
- (2') *Will John stay or will he not stay?*
- Will John stay or will John not?*
- Will John stay or will he not?*
- Will John stay or not stay?*

Therefore, it is simplest to say that (2) and the set (2') are all resultants of various zeroings and pronounings from (3), as (1) is of zeroing from (2). Thus, taking zeroing as an operation (reduction, section 8) which produces transforms,⁴ we obtain the interrogative form (1) from the unreduced disjunction (3). For every question of form (1), there also exist forms (2), (2') and (3) as questions, and vice versa: the word-class domains of forms (1), (2), (2'), (3) are identical.

This analysis fits several syntactic peculiarities of the interrogative forms above. One is the fact that the question of the negated sentence differs only in speaker's attitude but not in substantive meaning from the question of the positive sentence. In Lewis Carroll's *Will you, won't you, will you, won't you, will you join our dance? Won't you, will you, won't you, will you, won't you join our dance?*, the same invitation is given in both forms. Thus the

question is a posing of alternatives; the choice as to which alternative is given first merely directs the attention, but does not make a substantive difference as to what is being asked.

The intrinsic presence of *or not* in the source form of yes–no questions explains why questions in particular introduce *any* where the positive answer has *some*: *Does he have any records? Yes, he has some.* The dependence of *any* on *not* and *or* is clear in such sentences as *He does not have any records; Any record, whether this one or that, is satisfactory.*

The disjunction in (2)–(3) shows that the source of the yes–no interrogative is not simply a question, but involves the alternative of a questioned statement and its questioned negation. To this is related the fact that in many languages a negative question cannot be comfortably answered by either *yes* or *no*.⁵ The positive answer to *Will John stay?* is *Yes.*, and its use is less comfortable in answer to *Will John stay or not?*, and virtually excluded in answer to the full form *Will John stay or will John not stay?* When the question is of the negative *Will John not stay?*, *Won't John stay?*, or equivalently when the negative disjunct is questioned first, as in

(4) *Won't John stay or will he?*

we cannot answer *Yes*, but only *Yes, he will* or *No, he won't*, or even *Yes, he won't stay.*

The question to be answered *yes, no* presents a statement with its negated disjunct suppressed. This becomes clearer if we consider the following property of *yes*: If one person asks a second *Did you close the door?* and the second thereupon closes the door and then answers *yes*, then the second has not answered truthfully. But if after closing the door he answers by saying merely *I closed the door*, he is answering truthfully even if with some dissimulation. Thus, the tense in the “I closed the door” which is implied in *yes* is not merely the same morpheme *-ed* as the tense in the question, but specifically refers to the tense of the question. It follows that *yes* does not mean simply to repeat the question (i.e. the words of the question) in positive form, but involves a reference to the specific prior occurrence of the content of the question, something like *Yes to your questioned statement* (i.e. to my having closed the door at the time you asked), with *No* being *No to your questioned statement*. *Yes* includes a zeroed citing of the question. The yes–no words, including French *si*, are sentence-referentials to single statements (mostly, but not necessarily, under *ask*): *yes* being a referential to any statement (but uncomfortable on negative ones, i.e. those whose highest operator is *not*); *no* a referential adding negation to the statement; and *si* being a referential adding negation to a statement whose highest operator is *not*.

Their use as answers to questions depends on the occurrence of such statements (without other disjuncts to confuse the issue) under *ask* or question-intonation.

2. DISJUNCTIONAL QUESTIONS

Deriving the yes–no questions from a disjunction makes it possible to consider them a special case of the general disjunctional interrogative, as in

- (5) *Will John stay, or will he go?*,
 Will John stay, or will Mary?
 Will John stay, or will Mary leave, or should we give up the whole plan?

Then sentences like (1)–(4) are those cases of sentences like (5) in which one of the disjuncts is a negation of the other.

This is not to say that a yes–no question, such as *Will John stay?* is a transform of a general disjunction, such as *Will John stay or will he go?*, as indeed is obvious from the availability of *Yes* and *No* for the former and not for the latter. The pure yes–no question *Will John stay?* is a transform only of *Will John stay or not?*, *Will John stay or will he not stay?*, etc., i.e. of a particular kind of disjunctional question in which only two alternatives are given and in which the second alternative contains only the material of the first alternative plus the negation which is implicit in the disjunction itself. That the negation is implicit in the disjunction explains why *Will you stay?* and *Won't you stay?* differ only in attitude and not in substantive meaning. The material of the first alternative is zeroable referentially in the second as being a repetition; and the remaining *or not* is zeroable as being implicit, hence contributing no information (in the sense of section 8 below) under the disjunction-introducing *whether*.

The above connection of questions to disjunctional interrogatives points the way to transformations between interrogative and non-interrogative forms. For all questions of the types above, (1)–(5), there exist corresponding sentences with N_1 asks N_2 plus the given question; here N_1 , N_2 are any subject and object of *ask*, and *ask* is not only in the present but under any tense. Thus we have: *He asked her: Will John stay?*, *I ask you: Will John stay or will he go?*, etc. The addition of *He asked her*, *I ask you*, etc., leave the inequalities among the questions unchanged, and thus satisfy the practical transformational criterion above. However, they constitute a family of additions and not a single zeroable constant like the *or not* of (2). It will be seen below (8.2) that one member of this family, *I ask you*, has a unique relation to its following question, making that member zeroable. By this zeroing of *I ask you*, we can derive each question from *I ask you* plus that question.

We can now go a step further, and note that for every sentence of the form (disregarding tense)

N_1 ask N_2 : *Will John stay?*

There exists a sentence of the form

N_1 ask N_2 *whether John will stay*

and similarly for the other question types, (2)–(5) above. Thus, *He asked her whether John will stay, I ask whether John will stay or John will not stay,*⁶ and so on. There is a transformation between the *ask* plus *whether* form and the *ask* plus question form, with *whether* (or *if*) replacing the question intonation and with the word order (and pronouncing and zeroing possibilities) being the same under *whether* as in assertion sentences.

The *ask* plus *whether* form is of a known sentence type. We find *I wonder whether John will stay, I wonder whether John will stay or not, I wonder whether John will stay or Mary will leave.* These have the question transforms, as in *I wonder: Will John stay?, I wonder: Will John stay or not?, I wonder: Will John or will Mary leave?*, and so for all the types (1)–(5). We also have verbs plus *whether* without the disjunction⁷ and without the question transform, as in *I doubt whether John will stay* (but not \nexists *I doubt whether John will stay or not, \exists I doubt: Will John stay?*). Some of these verbs, such as *doubt*, also have *that* as introduction to their sentential object (without a disjunction), as in *I doubt that John will stay.* And of course other verbs have only *that* and not *whether* introducing their sentential objects, as in *I believe that John will stay.*

Such sentences, one of whose arguments (8.1) consists of *whether* or *that* plus sentence, exist in the grammar independently of question. It is clearly desirable therefore to say that sentences containing *ask*, *wonder*, etc., plus question are derived from the structurally more general sentences containing *ask*, *wonder*, etc., plus *whether* with purely disjunctive *or*. That is, for those verbs which have *whether* plus purely disjunctive *or* introducing their sentential objects, the *whether* can be replaced by question intonation, usually with permuting of the tense to before the subject: *I wonder whether John will leave or not* \rightarrow *I wonder: Will John leave or not?*⁸

If the tense is a suffix, it receives a non-morphemic carrier *do* upon permutation: *I wonder whether John left. I wonder: Did John leave?* If the verb is *be* or auxiliary *have* (optionally, all other occurrences of *have*), *be* and *have* move with their tense: *I wonder: Is John leaving?* (from *John is leaving*), *I wonder: Had John left?*, *I wonder: Has he records?* (or: *Does he have records?*). But *be*, *have* do not move with non-suffixed tenses: from *John*

will be leaving we have *I wonder: Will John be leaving* (not: \nexists *Will be John leaving?*).

All the disjunctive questions, both the yes–no types (1)–(4) and the others (5), can be thus derived from assertions which have neither the intonation nor the special forms of the interrogative. And this, without adducing any transformations which have not been established independently of the question form.

3. WH-INTERROGATIVES

3.1. *The Main Form*

We now consider the remaining interrogatives, the so-called *wh*-questions; here the analysis happens to be a bit simpler for English than for other languages. These interrogatives are, e.g.,

- (6) *Who stayed?, What did he see?, Where did it fall?*

Here, too, we have the transforms with *ask*, as in *They asked me: Who stayed?, I ask you: Where did it fall?*; but not the forms with *whether* (e.g. not \nexists *I ask you whether who stayed*), and not the disjunctions (e.g. not \nexists *Who stayed or not?*). However, the *wh*-words of these questions can themselves be considered as *whether* plus pronouns for disjunctions. If we begin with a question whose disjuncts contain parallel structures, e.g. *I ask you whether John stayed or Frank stayed or Carl stayed*, the usual zeroing under *or* would yield *I ask whether John or Frank or Carl stayed*. If *-o* is taken as a pronoun (itself not a free word) for the disjunction, and *wh* as a non-free-word variant form of *whether*, then *whether John or Frank or Carl* would be pronounced by *who*.

There are various indications that the second parts of these *wh*-words are indeed pronouns for disjunctions. Thus in the independent *whether*-sentences (e.g. *Whether you stay or not, I'm going; Whether you said it or ... or Mary said it, I'm going; Whether the dollar falls or the mark rises, the result is the same*) the place of *whether* plus a disjunction of nouns (or preposition-plus-noun, or nominalized sentences) is taken by a *wh*-word: *Whoever said it, I'm going; Whatever happens, the result is the same*.⁹ One might ask why the *wh*-pronouns do not have disjunctive meaning in the relative clause (e.g. *The man who left phoned*). This is because there we have a "relative clause" conjunction meaning 'same' which fixes the referent of the pronoun (*-o*, or *who* depending on details of analysis) in the second component sentence as being that one of the possible disjuncts that is the same as the indicated

noun (*man*) in the first.¹⁰ But in the occurrences of *whether* we have not a conjunction with this meaning, but merely a bridge (an argument indicator, 8.1) between a verb and its argument when that argument is a disjunction of sentences; hence the pronoun retains the value of a disjunction of all the nouns or other constructions in its domain. It should be noted that the other argument-indicator bridge-words, which introduce the sentential subject or object of a verb, are also words which occur otherwise as conjunctions: *that* in *I know that he left* but also in *I did it (so) that he may be impressed*; *for* in *I prefer for him to lose it* but also in *He did it for his team to win*.

If we assume the *wh*-questions (6) to be formed out of a *wh*-variant of *whether* plus *-o*, *-at*, *-ere*, etc., pronouns for disjunctions, we find that all the forms of (6) are produced by the zeroings and permutations established for the whole grammar, and by the transforms established above for the disjunctive questions (1)–(5). We can also say that the disjunctive pronouns are *who*, *what*, etc. formed under the *I ask you whether*, etc. The zeroings and permutations in parallel disjuncts produce the concentrated disjunctions as in *John or Frank or Carl* above, under *whether*; and together these form *who*.

The questioned words (e.g. *John*, *Frank*, *Carl* above) may be in a position other than the subject in the questioned parallel disjuncts. In that case the pronoun for their concentrated disjunction is permuted to before the subject:

I ask you whether he saw John or he saw Carl

undergoes zeroing and permutation to

(7) **I ask you whether John or Carl he saw*

which is pronounced into

I ask you whom he saw → I ask you: Whom did he see?

The permutation of the disjunction (*John or Carl*) can be taken as being necessarily followed by the pronouncing: i.e. only the product (succession) of these two reductions takes place, and not each separately (in this form). In that case, the intermediate form (7) does not occur as a sentence (see 4 below).

In saying that the interrogative presents a disjunction of statements which are possible answers to that interrogative, and that the *wh*-pronouns are disjunctions of arguments in these statements, it is not the intention to say that the *wh*-pronoun in a question is formed from disjunction of the arguments in the possible answers. The arguments in the possible answers may be

known to the speaker, as in *Who knows the answer?* said to a class: the *who* here pronouns the disjunction of all names of students in the class. But in *What did he eat?* the possible answers are not in general known to the speaker, and for him the *what* pronouns a disjunction such as *fish or meat or something else*, or even perhaps such as *some one thing or some other*. In *Who shall abide the day of his coming?*, the *who* is for a disjunction of unknown arguments, but all ultimately names of people; for the speaker it is a disjunction such as *some particular person or another or someone else*.

When the question-word is *which* the answer is more likely to be one of a disjunction known to the speaker: *Which book do you prefer?*, *Which solution is right?* But the answer is not always from a set known to the speaker, and may even consist of a characterization rather than a list: *Which horses have won the Derby?*, *Which trees are deciduous?* (Ans., e.g.: Those that shed their leaves.) *What* is more likely to be answered not from a disjunction known to the speaker, or by a characterization presumably not known to the speaker: *What would you like to read?*, *What are the prime numbers?*, *What is a deciduous tree?* Hence *what* is in general a pronoun for a disjunction not of individual words (proposed by the speaker) but of indefinites, such as *one thing or another, the bearer of one property or of another*.

In this paper, the disjunctions are given in terms of possible specific answers (*John or Frank*), or letter-variants for these (*X or Y*). However, in all cases it should be understood that the disjunction in the question can include indefinite pronouns, for possible answers that are not envisioned at the time of the question: *something or something else, John or Frank or someone else*.

The disjunctions can be exclusive, as in *Who discovered the Pacific?*, or inclusive, as in *Who read Homer?* It has been pointed out by Henry Hiz that the disjunction need not be specifiable in advance or even finite, as in *Which numbers are prime?*, *Which are the prime numbers?*. The disjunction underlying *what* here would be something like *I ask you whether this or that or another are prime numbers* or *I ask you whether certain numbers or others are the prime numbers*.

Once the *wh*-questions (6) have been derived from *whether* forms, the transformations are in detail approximately the same as for the disjunctive questions (1)–(5). The zeroing of *whether*, which takes place when the interrogative intonation is put on, does not apply to the non-free form *wh*. The permuting of the tense to before the subject does not occur when the subject is pronounced into one word with the *wh*: *I ask you who stayed*, but not *‡ I ask you: Did who stay*. When the subject is an independent word, the permuting occurs, and it can even occur without the question intonation:

I asked her what he saw, I asked her what did he see, I asked her: What did he see?; I asked her where it fell, I asked her where did it fall, I asked her: Where did it fall?

In this way it is possible to obtain all the interrogative forms – the single yes–no question (1), the negative-disjunction yes–no question (2)–(4), the disjunctive question (5), and the *wh*-question (6) – as transforms from a single source *I ask you whether* (where *I ask you* is zeroable by section 8) plus a disjunction of sentences, with the aid of a single set of zeroings and permutations, known elsewhere in the grammar, which apply in roughly the same way to all the forms.¹¹

3.2. *On It-Forms and the Like*

The yes-no interrogative form applies with no change to all sentence forms. However, the *wh*-interrogative is sharply limited for sentence forms containing *It is*, *There is* and the like. It will be seen that the *it*, *there*, etc., words in these constructions are reductions (in the sense of section 8) and constants, and are not members of any disjunction of words that can occur in their position. Hence they cannot be questioned by *wh*-words, which questions a disjunction of possible answers in the given word-position.

3.2.1. *It*. In the *It is* form, there are three types of sentence.

First, there is the “impersonal” *it* in *It is raining*, *It is cold*, *It’s nice here*, *It rained*, *It’s 6 P.M.* Here the direct *wh*-interrogative of 3.1 does not occur: \nexists *What is raining?*, *What did it do?* (Ans.: *Rained*), and hardly \exists *What is it?* (Ans.: *Raining*, *6 P.M.*). The interrogative forms which are commonly found have an additional element, e.g. (1) *How is it out?*, *What is it like, out?*, *What time (or: hour) is it?*, which are formed from such sentences as (2) *It is cold out*, *It is 6 o’clock*. The presence of the extra element suggests a relation to some *It*-less two-part sentence of the type (3) *The outside is cold*, *The clock says 6*. The form (1) has no regular derivation from *It*-less statements. However, other interrogative forms close to (1) appear without *it*: (4) *How is the weather?*, *What is the day like?*, *What is the time?*. These interrogatives have been formed in the regular way from such sentences as (5) *The weather is rainy*, *The day is cold*, *The time is 6 P.M.* The subjects of these latter sentences (5) are specific (or “appropriate”) in respect to their objects (e.g. *time* in respect to *6 P.M.*); they have extremely high likelihood relative to these objects and can therefore be reduced to some constant such as *it* (8.2), which we then see in *It is 6 P.M.*, etc. Since several of these appropriate subjects have been reduced to the same word *It*, the specificity of the *It* is clarified by adjoining in (2) an appositional or modifying word (*out*, *o’clock*) related to

the original appropriate subject; and it is this form that is questioned in (1).

Such a reductional explanation is harder to come by for *It rained*, *It is raining*; these can, however, be arguably derived from *The rain rained*, *The clouds rained*, *The rain fell*. There are languages in which the word for 'rain' occurs only as a noun and not as verb. Whatever the details in each language, the interrogative forms support the view that the "impersonal" *it* and the like is derived from other, more regular, forms, such as (5). In itself, as a reduction of a subject uniquely appropriate to its object or predicate, *it* is part of no disjunction capable of being questioned by a *wh*-word.

Second, there is the *It is* of *It is John who stayed*, *It's his style that she dislikes*. Here most direct interrogative forms do not occur: \nexists *What is John?* (to be answered *It* or *It who stayed.*), \nexists *What is it?* (to be answered *John*, or *His style*, or *His style which she dislikes*), \nexists *What is John who stayed?* (to be answered *It.*). But one form exists: *Who is it who stayed?* (Ans. *John*), (6) *What is it that she dislikes?* (Ans.: *His style.*). This last question is available because it neither questions *It* (which is not a member of any disjunction), nor the whole residue of the sentence (which is not a single position for a disjunction); rather, like all *wh*-questions, it questions a disjunction at one argument position while repeating the rest of the sentence, which is not being questioned.

That *it* here is a constant is supported by the following: In (6), the statement that is being questioned is *It is X that she dislikes*, not **X is it that she dislikes*. This can be checked when we have, e.g., *may be* in place of *is*. In keeping with the derivations at the end of section 4, the form *What may it be that she dislikes* has to come from *I ask whether it may be his style or B or ... or X that she dislikes*. One hardly says \nexists *What may be it that she dislikes*, which would come from \nexists *I ask whether his style or B or ... or X may be it that she dislikes*; and correspondingly one hardly says \nexists *I ask whether it that she dislikes is his style or B or ... or X*, from *It that she dislikes is his style*. It follows that *that she dislikes* does not occur as a modifier of *it*, in the way that *that she dislikes* modifies *the book* in *the book that she dislikes*. Hence *it* here is a constant.

Lastly, here is the *It* of *It's true that he left*, *It surprised her that he left*. Here there are no direct *wh*-interrogative (3.1) forms: \nexists *What is true?* (to be answered *It that he left*), \nexists *What is it?* (to be answered *True that he left*), \nexists *What is true that he left?* (to be answered *It*), \nexists *What is it true?* (to be answered *That he left*), \nexists *What did it surprise her?* (to be answered *That he left*). The only possible – and at that quite uncomfortable form is *What is it, that he left?* (Ans. *True.*); *What did it do, that he left?* (Ans. *Surprised her.*); with required commas. These questions are formed from the two-

sentence source of *It's true that he left*, etc. — roughly: *It's true, namely that he left*, etc.

In summary: The full source forms of the question, e.g. *I ask you whether it surprised her that he left*, are always available, as they are also for the statement-forms without *it*, as in *I ask you whether that he left surprised her*. The questions with *wh*- and interrogative intonation, which are derived from these, are almost entirely unavailable for the *it*-statements, in a way that supports the view that this *it* is neither a noun a referential (including deictic) pronoun, but rather a variant, an “appropriate” reduction,¹² i.e. a reduction of material whose presence has been assured by its syntactic neighbors. The reduction is in this case to *it*, whereas most “appropriate” reduction is to zero; this conforms to the fact that in English the subject-position is only very rarely empty.

3.2.2 *There*. A somewhat similar situation holds for the *There* forms, such as *There is a man here*, *There came a letter*, *There's a man I want you to meet*. The direct *wh*-interrogative questioning *There* does not exist: \exists *Where is a man here?* (to be answered: *There*). Also, there is no \exists *What is there?* (to be answered: *A man here*.) However, we have *Who is there you want me to meet?* As in the case of *What is it she dislikes* (3.2.1), this shows that the *wh*-interrogative form can be made from sentences in the *It* and *There* forms, but only when the *wh*-pronoun refers to a disjunction of words in one position of the source question, while repeating the non-questioned portions of the source.

4. TRANSFORMATIONAL SUMMARY

Interrogative sentences in all the forms considered above are produced and analyzed by using the following operations:

- (a) *or*, an operator (8.1) or a pair of sentences.
- (b) N_1 *ask* N_2 *whether* (with any tense), operating on *or*.
- (c) Tense-permutation, $X\Sigma_i t_i O_i Y \rightarrow X t_i \Sigma_i O_i Y$, where Σ_i , t_i are respectively the first argument (subject) and tense of S_i , which is the sentence whose main verb is O_i , and where X is any pre-subject material in S_i ; X includes the interrogative intonation on S_i (when it is formed, 4f), but not the *whether* which may introduce S_i . As noted at the end of section 2, if O is *be*, *have*, these move with the tense if the tense is suffixed; for other O , a suffixed tense receives a carrier when it is permuted.
- (d) Zeroing of parallel repetitions, and permutation of the residue, in the second of two sentences connected by *or* (or *and*). This produces e.g. *John will invite Carl or Mary* from *John will invite Carl or John will invite Mary*.

Here belong the zeroings of the negated repeated sentence in section (1).

(e) Under an operator plus *whether*, a disjunction of arguments (formed by (d) above) is pronounced by *wh*-pronouns, e.g. *who*, which are approximately those occurring in the relative clause; these pronouns replace the *whether*, occupying its position. This means that the pronounced disjunction, if it was not of the subject (first argument) following *whether* had to be permuted to before that subject; for limitations on what can be permuted here, see 5.3. Thus: *I ask whether John will invite Carl or ... or Mary.* → *I ask whom John will invite.*

In English, the similarity between *whether* and the *wh*-pronouns makes it possible to say that the *whether* coalesces with the disjunctive pronouns. In that case, we have to say that in multiple questions (6.1) the *whether* coalesces independently with each disjunctive pronoun, there being more than one under a single *whether*.

(f) After an operator with *whether* and pure-disjunctive *or* ((b) above) has entered a sentence, a question-intonation can come on the argument-sentence introduced by *whether*. With this, the *whether* is dropped (but not if it has been replaced by a *wh*-pronoun).

(g) After the argument of *I ask you* has received a question intonation (c), the *I ask you* has a unique informationless status, and is zeroable.

(h) Certain specific "appropriate" reductions, comparable to others in the language, are noted in the special forms of 3.1.

None of the above are ad hoc. Even (e) is found in certain other situations in which *whether* and *wh* occur (e.g. in *whoever*, etc., and in the relative pronouns). And the intonation of (f) and zeroing of (g) occur also in the imperative, and elsewhere, including the assertion of sentences. (c) is not uncommon, as in *Little did he know*, and again in the imperative, as in *Do thou go now*.

None of these require any ordering other than what results from their definitions. The operators (a) and (b), like all others, can enter a sentence when their required arguments are in the sentence. The reductional (paraphrastic) transformations, (c)–(h), take place on their stated operands as soon as these develop in the sentence (8.2; with a delay in some cases until the stated conditions are satisfied).

Virtually all of the above, operators and reductions, are optional. However, some of the reductions are defined for particular situations (e.g. *whether* does not satisfy *X* for (c)), and the effect is that certain sentence-forms do not exist in the language. Also, in some cases a reduction *A* requires that some other reduction *B* have taken place, i.e. *A* acts there only on the resultant of *B*; e.g. (f) below after (e). Finally, over certain subdomains of certain

reductions, only products (i.e. successive applications) of two reductions are found, and not either reduction alone. E.g. in (2) below (f) alone does not occur, or hardly occurs, but must be followed by (c). Since virtually all restrictions are in the reductions, the unreduced forms permit every kind of question, as is noted throughout.

A few examples are appended of how the interrogative forms are produced in this way.

- (1) I ask you whether John will study physics or not.
 \xrightarrow{f} (2) I ask you: John will study physics?
 \xrightarrow{g} John will study physics?
 (2) \xrightarrow{c} (3) I ask you: Will John study physics?
 \xrightarrow{g} Will John study physics?

Since (2) is rare, it is more reasonable to obtain (3) by the product fc (with c required rather than optional) from (1).

- I ask you whether John will study physics or Mary will study physics.
 \xrightarrow{d} I ask you whether John or Mary will study physics.
 \xrightarrow{e} I ask you who will study physics.
 \xrightarrow{f} I ask you: Who will study physics?
 \xrightarrow{g} Who will study physics?

- I ask you whether John will study physics or John will study chemistry.
 \xrightarrow{d} I ask you whether John will study physics or chemistry.
 \xrightarrow{e} I ask you what John will study.
 \xrightarrow{c} (4) I ask you what will John study.
 \xrightarrow{f} I ask you: What will John study?
 \xrightarrow{g} What will John study?

The acceptability of (4) is not clear. In any case, f here does not take place without it in English (there is no def ; e.g. \nexists *I ask you: What John will study?*). We thus seem to have a combined cf , interdependent somewhat differently than in (3) above.

- I ask you whether the book will be the prize, or the pen will be the prize.
 \xrightarrow{defg} What will be the prize?
 I ask you whether the book is the prize, or the pen is the prize.
 \xrightarrow{defg} (5) What is the prize?

I ask you whether the prize will be a book, or the prize will be a pen.

decfg → What will the prize be?

I ask you whether the prize is a book, or the prize is a pen.

decfg → (6) What is the prize?

Note that (5) and (6) are ambiguous.

5. WHAT CAN BE QUESTIONED

Everything can be questioned in the full *I ask whether ...* from, e.g. *I ask whether the comet is moving toward or away from the earth*. However, the main *wh*-interrogative form (of 3 above) with tense permuted to before the subject, is available only for those word-disjunctions which are pronounable by the *wh*-pronouns (known from the relative clause), namely for arguments (see 4 (e)). These are precisely the words which when not disjuncts can be permuted (with some naturalness) to immediately before the subject: *Him I met*, but hardly *∅ Met I him*. When the pronounced disjunction is permuted to this position, it is in the position of the *whether* which it replaces. The pronouncing and permuting are the two processes which form the *wh*-interrogative.

5.1. Adjectives, Verbs, Sentences

As example of *wh*-word availability (4 (e)): In English, the "objects" of *is* are movable to after the *whether*: from *The flower is blue*, *The flower is purple*, etc., we have *Blue is the flower*, etc. But English does not comfortably use *what* for *whether A₁ or A₂* (A: adjective), and a reduction of the above to *What is the flower?* is dubious. In contrast, from *I ask whether this flower is a poppy or this flower is an anemone* we have *I ask whether a poppy or an anemone is this flower*, whence by collecting the disjuncts *poppy or anemone* into the pronoun *-at* we obtain *What is this flower?*

In the case of verbs, neither are they permutable (*∅ I ask whether lost John the money or spent John the money*), nor is there a *wh*-pro-word for them. However, the *wh*-interrogative is formed for them by going through an aspectual *do* in which the nominalized original verb is the object of the new aspectual verb: *I ask what John does*. ← *I ask whether John does sculpting or ... or composing*. from *John does sculpting*. ← *John sculpts.*, etc.; *I ask what John did to the money* ← **I ask whether losing John did to the money or spending John did to the money* from **John did losing of the money*, etc. ← *John lost the money*, etc. It is true that the non-occurrence of the asterisked forms, with the explicitly nominalized verbs, may seem to cast doubt on this

analysis. However, the analysis is supported by the fact that the *what ... do* question is comfortable for action and state verbs, where an aspectual *do* is at least conceivable, and is more uncomfortable for verbs that are more relational, where aspectual *do* is more inappropriate, and finally is entirely excluded for *be*, where aspectual *do* is excluded. Thus, we would hardly have *What did John do to Mary?* for *John married Mary*,¹³ less so *What did John do to Mary?* for *John liked Mary*; and there is no \nexists *What did the bird do to a robin* for *The bird was a robin* (\nexists *The bird did being to a robin*).

In various languages the answer to *What did he do* is a verb plus object which is treated as object of *do* (*He did nothing else than lose the money*). The same extension of *do*, and the same difficulties and limitations, are found in other forms involving *wh*: *What he did was lose the money*, \nexists *What he did was to like Mary*. Also: *Losing money, which we may do next year ...*, \nexists *Liking Mary, which he may do next year ...*; \nexists *Weighing 50 lbs, which he will do next year ...*.

The lack of a *wh*-pronoun applies not only to verbs but also to whole sentences. Therefore, just as verbs are asked about by treating them as arguments of an aspectual *do*, so sentences are asked about by treating them as arguments of some zeroable aspectual predicate. Thus, the question *What happened?* can be derived from *I ask whether S_1n or ... or $S_m n$ happened* (*Sn* indicating a nominalized sentence). The answer is *$S_j n$ happened*, which is zeroable to *S_j*: e.g. (1) **His missing the train happened* *He missed the train*. That *What happened?* is related specifically to the "perfective" sentences which can be arguments of the "perfective" *happened* is seen in the fact that the answer to *What happened?* can be (a) *He fell asleep*, or *He missed the train*, but not (b) *He slept*, or *Pterodactyls were not birds*. We actually find (a) as subject of *happen*, given some textual support: (2) *The baby's falling asleep happened just in time*. *His missing the train can indeed happen*, but not \nexists *His sleeping can indeed happen*.

For the zeroing of aspectual (perfective) predicates like *happen* there is other evidence, and also theoretical justification. As to the other evidence: Sentences such as (3) *He fell asleep, which gave us our chance* seem to differ from all other occurrences of *wh*-pronouns, in that all others refer to arguments, and not to the highest operator (main verb) or to a whole sentence. Instead of saying that forms like (3) have this unique grammatical property, we can say that the source of (3) is the *wh*-connective operating on the pair of sentences *His falling asleep happened* (or *His falling asleep took place*) and *His falling asleep gave us our chance*, producing *His falling asleep, which gave us our chance, happened*, where zeroing of *happened* yields *He fell asleep, which gave us our chance*; note that the tense on *happened* is not zeroed, but

remains on the next highest operator under *happened*, namely *fall*, with the *-ing* being then dropped. This last analysis makes *wh-* here refer to two occurrences of *his falling asleep* as argument; hence it is unexceptional.

As to the theoretical grounds for the zeroing of *happen*: The only information it contributes in this position is the aspect of its argument-sentence. However, this aspect (roughly, of being an event rather than a state) is usually known to speakers of the language from the word-choices (especially the operator-choice) in the argument-sentence by itself, so that *happen* is informationless here.

If the possible sentence-answers which are being questioned are of a more durative (imperfective) aspect, e.g. *He slept*, or *Peterodactyls were not birds*, the question would use an imperfective aspectual predicate, e.g. *What was the situation?* (Ans. *He slept, He was asleep, What is the case?*)

Of course, one might argue that one does not say **His falling asleep happened* or **His sleeping was the situation*. But then one does say (2), and also *The situation was that he was asleep then* (and not \nexists *The happening was that he was asleep then*). The main thing to understand about such questions as *What happened?* and, above, *What did he do?* is that while sentences such as **His falling asleep happened*, **He did losing of money* have vanishingly small likelihoods of occurrence, they are not syntactically excludable from the grammar. These sentences can therefore serve to introduce the zeroable operator *happen* under which the operators and sentences become arguments, so that the *wh*-pronouns can refer to them as arguments. Then these operators and sentences, being now arguments, can be questioned, and can also be referred to in a relative clause and in the *what ... is* structure. Thus we have in the relative clause: *Losing money, which he does frequently, must stop*; and (3). And in the *what ... is* structure: *What he did was lose money all the time, Blowing smoke rings is what he did; What happened was his falling asleep, What happened was that he fell asleep*.

5.2. Scale-words

The relation of *wh*-pronouns to a disjunction of answers is seen in the lack of *what ... do* questions for scale-verbs, such as *cost*, *weigh*: \nexists *What does the book do to \$5?* This situation is due to the following: *The book costs \$5* is derived from *The book is \$5 in cost*, from *The book mounts (or: amounts) to \$5 in cost*. Similarly, *The book weighs 2 lbs.* is from *The book is 2 lbs in weight*, from *The book (a)mounts to 2 lbs in weight*. Since there is no *what ... do* question for *be*, there is no \nexists *What does the book do to 2 lbs?* to be answered *The book is 2 lbs. (in weight)*. There is also no \nexists *What does the book do to 2 lbs.* to be answered *The book weighs 2 lbs.* The absence of this

latter question is due to the fact that there is only one verb (or its synonyms), i.e. no disjunction, which connects *The book*, etc., with some number of pounds, and similarly with some number of dollars. Therefore we also do not have \exists *In what (respect) is the book 2 lbs. (or \$5.)?* to be answered *The book is 2 lbs in weight* (or: *\$5. in cost*). In contrast, in measures of distance, where, say, inches can measure width, height, etc., i.e. where the *what* would pronoun a disjunction, we can have *In what (respect, or: dimension) is the book 5 inches?*, to be answered *The book is 5 inches in height*, or *The book is 5 inches in width* (or: *in thickness*; or *The book is 5 inches high*, etc.).

That the scale-words indeed are derived from forms with *amounts* to can be seen from the manner in which the objects of the scale-verbs are questioned, showing them to be adverbial. Thus by the side of the somewhat uncertain *What is the book in thickness?* (to be answered *The book is 5 inches in thickness*) we have the more common *How much is the book in thickness?* (to be answered *The book is up to 5 inches in thickness* \leftarrow *The book amounts to 5 inches in thickness*), and above all *How thick is the book?* (to be answered *The book is 5 inches thick* \leftarrow **The book is thick by 5 inches*). In the scale-verbs, we have *What does the book weigh?* (to be answered *The book weighs 2 lbs.*), but also the adverbial *How much does the book weigh?* (to be answered **The book weighs to 2 lbs.*), and *How much is the weight of the book?* (to be answered *The weight of the book amounts to 2 lbs.*).

5.3. Permutability

We now consider the permuting of pronounced disjunctions to replace the *whether*.

Within a sentence which contains no conjunctions, or in which zeroing has reduced the conjunctions to being merely on words, the arguments can be permuted to before the subject far less uncomfortably than can the operators: *A book John bought* (more comfortably *This book John bought*), but \exists *Bought John a book*, \exists *Tall John is*. Although the permuting of a disjunction of arguments is far more uncomfortable, as in **A book or a record John bought*, we have to say that in the interrogative form the pronouns of these disjunctions is permuted in this way. That is to say, the product of disjunction and pronouncing takes place on the permuted forms (i.e. on *A book John bought or a record John bought*), but does not take place on those words which are not permuted (e.g. *bought*, *tall* above).

However, even arguments are not permutable if these are inside of segments which a conjunction has brought into a sentence: i.e. if these are inside of some transformed sentence S_2 which the conjunction brought into the sentence S_1 . This restriction is due to the property, stated in 8.2, that after

a sentence has combined with another – and has been possibly changed thereby – it is in general no longer subject to operations on its parts. (Certain special cases require further discussion.) Therefore material from inside a relative clause cannot be permuted to before the subject of the host sentence. E.g. given (1) *I ask whether he met a man who spoke French or he met a man who spoke Italian*, we cannot have the *wh*-interrogative questioning of the languages: ❑ *What did he meet a man who spoke?* However, a noun in the host sentence (to which the relative clause is appended) can be questioned together with any adjective or relative clause attached to it. E.g. given *I ask whether he met a man who spoke French or ... or a woman who spoke Italian*, we have *Whom did he meet?* (to be answered *He met a man who spoke French*).

The case is different when the apparent modifier of the noun is actually part of the object of a verb, as happens for a special set of verbs (e.g. *seek, want, see*). Thus in *I ask whether you are seeking a man to teach French or a man to teach Italian*, where *to teach* (with its object) is part of the object (or “complement”) of *seek*, we can permute *French or Italian* to obtain **I ask whether French or Italian you are seeking a man to teach*, yielding *What are you seeking a man to teach?*

Less comfortably, one can permute adjuncts of the verb: In *I ask whether he left home to teach French or he left home to teach Italian*, the disjunction pronouns and permutes to yield *What did he leave home to teach?* If, however, the disjunction is in the adjunct of a noun, permutation is impossible, as was seen above: *I ask whether he met a man about to go to England or he met a man about to go to France* does not yield ❑ *Where did he meet a man about to go (to)?* Also from *I ask whether he met a man going to England or he met a man going to France* we do not obtain ❑ *Where did he meet a man going to?*

If we are questioning a disjunction of words (which are permutable to before the subject) all of which have the same relative clause after them, we can use the *what* for the disjunction of host-words alone, leaving the common relative clause of be stated in the question. Thus from *I ask whether you met John that she knows, or you met Mary that she knows, or ... or you met Tom that she knows*, we obtain **I ask whether John that she knows you met, or ... or Tom that she knows you met*, yielding *Whom that she knows did you meet?*; or we can obtain **I ask whether John you met that she knows, or ... or Tom you met that she knows*, yielding *Whom did you meet that she knows?*

Although material from inside a noun-modifier cannot be permuted out (as in *a man going to England, a man who spoke French or Italian* above), there is a certain possibility of permuting the host noun with its adjunct. This

opens an indirect path to questioning noun modifiers – adjectives and the like. Thus from *I ask whether you support a plan to do X or a plan to do Y* we obtain **I ask whether a plan to do X you support or a plan to do Y you support*, yielding *What plan do you support?* The *what* here questions not a noun but the modifiers of the stated noun, *plan*; but these modifiers can be permuted to replace *whether* only in company with *plan*. If the disjunction of modifiers is not sufficiently specified by the *what*, one can form the question out of a noun which classifies the adjectival disjunction and which carries the original host noun as modifier. Thus from *I ask whether you need typing paper or scratch paper* we obtain *What paper do you need?* But we can obtain the more explicit *What kind of paper do you need?* from *I ask whether you need the typing kind of paper or the scratch kind of paper*; and we obtain *What color paper do you need?* from *I ask whether you need blue color of paper or green color of paper*.

5.4. Summary

What can be questioned in the *wh*-interrogative form depends directly upon the processes which create that form:

The pro-morphemes which can be attached to the *wh* refer to arguments and not operators (see 4(e) and 8.1).¹⁴ Thus, verbs are questioned only when nominalized as arguments of an aspectual verb *do* (5.1). In English, adjectival operators are not generally available for questioning (5.1), until they have been made modifiers of a noun, in which case they can be questioned together with that noun (5.3). Occupational and other classifier “predicate” nouns can be questioned, as in *What is he?* (to be answered *He is a clerk, He is an American*); but these can be viewed as second arguments (objects) of a classificatory verb *is* meaning ‘is a member of’, ‘is a case of’. The *wh*-questions *where, when*, etc., which include an operator preposition, can be considered to be questions not of the preposition but only of the noun which is its second argument. Thus *Where is it?* is a morphophonemic variant of *In what (place) is it?*, to be answered *It is in A or B or ... or E*.¹⁵

Since the question is derived from disjunctions of statements (i.e. of possible answers), and the *wh* words are pro-morphemes of disjunctions, there is no *wh*-interrogative which questions the *it, there* of 3.2.1, 3.2.2 above.

Since the *wh*-interrogative form involves permuting (and thereupon pronouncing) of the disjunction to after the *whether*, more precisely to before the subject-position under the *whether*, the form is not available for material that cannot be permuted to that position. Thus we have *I ask whether X or Y entered*, yielding *I ask who entered*; and *I ask whether X or*

Y she took, yielding *I ask what she took*. But we cannot permute to in front of S_1 material from inside a relative clause S_2 in S_1 (5.3), because all changes in a sentence S_2 are made when that sentence is formed and not after that sentence has combined (e.g. as a relative clause) with another (see 8.2). Therefore for *She knows a man who is studying English or French*, we cannot have \exists *I ask whether English or French she knows a man who is studying*, \exists *I ask what she knows a man who is studying*. Also given *He left because she phoned or they quarrelled*, we have *I ask whether because she phoned or they quarrelled he left*, and *I ask why he left*. But given *He left, and she phoned or they quarrelled*, there is no permutation to \exists *And she phoned or they quarrelled, he left*; and there is no questioning form for the *and*-clause.

6. UNPERMUTED AND MULTIPLE INTERROGATIVES

The *wh*-words can also be used in situations where the conditions for permutation are not satisfied; but then we do not obtain the main *wh*-interrogative form (of 3 above) with its permuted tense and with the *wh*-word at the head. A variety of questions beyond the forms seen above are obtained in this way.

6.1. Multiple Questions

Unpermuted *wh*-pronouns are found when two or more sentence-positions are simultaneously questioned, i.e. when the *wh*-pronouns are used for two or more disjuncts. If we begin with

I ask whether X or Y or ... or Z saw A or B or ... or E,

we can obtain first *I ask whom did X or Y or ... or Z see*, and then (1) *I ask whom did who see*, although the latter is uncomfortable since pronouncing a disjunction (*X or Y or ... or Z*) in such a position, namely after the tense-permutation in *did*, does not otherwise occur. Alternatively we can obtain first *I ask who saw A or B or ... or E*, from which we cannot proceed because there is no free subject of *saw* to before which the *A or B or ... or E* can be permuted (see 5.4). The disjunctive pronoun for *A or B or ... or E* therefore remains unpermuted, yielding

I ask who saw whom,
(2) *Who saw whom?*

It may be best to say that the two disjunctions are pronounced independently of each other (in effect, simultaneously), with the second-argument pronoun (for *A or B or ... or E*) being either permuted (1), or more comfortably not

(2), depending on whether the first-argument pronoun is accepted or not as the subject (to before which the permutation has to occur). Such unpermuted question words can occur for as many disjunctions as there are in the *I ask ...* form: as in

Who said what to whom when?

In most cases, the set of possible answers to such questions is formed by the cross-products of the disjuncts. However, the looseness of use of *respectively* makes it possible to use this question form when the possible answers are limited by a disregarded *respectively*, as in *Who beat whom?* for *I ask whether Fisher or Spassky beat Spassky or Fisher (respectively)* ← *I ask whether Fisher beat Spassky or Spassky beat Fisher.*

6.2. Tag Questions

The repetitive-tag question (*You'll go won't you?*) is peculiar to English, and like other constructions peculiar to one language requires an involved transformational explanation. We note first that the first portion (*You'll go*) does not have question-intonation, although question-intonation exists independently of the interrogative permutation: *You will go?*, *Will you go?* For judging the semantic effect of the negative second portion (*won't you*) we note that to ask the negative of the questioned statement indicates surprise, opposition, and the like in respect to the negative statement: *You won't go?*, *Won't you go?* And to distinguish the tag question from the direct disjunctive interrogative (e.g. *You will go, or won't you?*), we note that the latter has on the first disjunct an intonation similar to a composite of interrogative and comma, and on the second disjunct an intonation similar to comma, quite different from the tag question. Thus we have: *Is John going there or is Mary coming here?* Similarly without permutation: *John is going there or Mary is coming here?* Similarly also with comma at the *or*: e.g. *You'll go there, or won't you go there?*; *You'll go there, or won't you?*; *You'll go there, or you won't?*; *Will you go there, or won't you?*; *Will you go there, or you won't?*; *You won't go there, or you will?*; *You won't go there, or will you?*; etc. All combinations occur here: with or without the interrogative permutation, or repetitional zeroing; and with either negative or positive first. The only forms which are very unlikely, except as jokes, are *Will you go or will you?*, etc., on the selectional grounds of *or*.

The intonation of the repetitive-tag question, which is approximately a comma intonation followed by an interrogative, is approached in tag-constant questions, such as the following: *You will go, right?*; *You will go, no?*; *You*

will go, yes?; *You will go, isn't that so?*; etc. After the negative, hardly anything can be asked except *right: You won't go, right?* The French *n'est-ce-pas* is like the *no? isn't that so?* above, rather than like the repetitive-tag questions proper, which will be seen below to fit into a special set of constructions. In the construction of the tag-constant questions above, the first part, ending in a comma intonation, is itself not a question but a statement: *You will go, etc.* A question does not seem to occur in this construction: *Will you go, no?* Hence the tag-constant question is an assertion under comma intonation followed by an interrogative word or sentence referring to that assertion (such as *yes?, no?, Is that so?*).

Before turning to the repetitive-tag questions, we consider the following:

You will go there now	, which	I hope
You won't go there now	, as	I'm sure
	, so	I know
	,	∅ I deny

This diagram is intended to summarize *You will go there now, which I hope;* *You won't go there now, as I'm sure;* *You won't go there now, I know;* etc. *You will go there now, which I hope* is produced by *wh* (relative clause) operating on the sentence pair *You will go there now, I hope you will go there now*. The repeated *You will go there now* is dropped (pronounced into the *which*), hence ∅ *You will go there now, which I hope you will go there now*. And the residue of the second sentence can be permuted to inside the first, as in *You will, which I hope, go there now*. These two properties are characteristic for the *wh*. Now these two properties hold also for the other sentences illustrated in the diagram. Thus ∅ *You will go there now, as I'm sure you will go there now;* ∅ *You won't go there now, I know you won't go there now* (at least, not with the intonation of the diagram sentences). Also we have the permuted forms: *You will, as I'm sure, go there now;* *You won't, I know, go there now*. Clearly, then there is a set of connectives having the *wh* property; whether they contain a zeroed *wh*, or simply belong in a family with *wh*, does not have to be discussed here. They all mean a second operator which somewhat weakens the assertion of the first sentence; in particular the pure comma member of the *wh* family indicates an afterthought: *You'll go, I hope*. The structure of these, then, is a member of the *wh* family of connectives (including comma as connective, not simply as intonation) operating on (1) an assertion A and (2) an operator on A.

The *wh* family of connectives requires that some material be repeated in the two sentences which it conjoins. This material need not be the whole first sentence, as above. It can be any argument in the first sentence. When

the repeated argument is a noun-form, the result is the well known relative clause and apposition: operating on *My friend left* and *My friend is the ambassador*, they produce: *My friend who is the ambassador left; My friend, the ambassador, left*. When the repeated argument is the verb under tense, we obtain: *You will go there now, which he won't; You will please go there now, which she can too; You must not go there now, as I will*; etc. The two conjoined sentences are independent, except for the repeated word, and all combinations of negative and positive exist. As is always the case for *wh* conjoins, they can be permuted to inside (but not before) the first sentence: *You will, which he won't, go there now; You will please, which she can too, go there now; You must not, as I will, go there now*. When the member of the *wh* family is the comma connective, there appear to be selectional restrictions, of the order of those of or above: we find *You will go there now, you will; No, you're not coming, you're not*; but apparently not other second sentences. That is to say, what the comma connective requires (as a member of the *wh* family) to be repeated, and therefore requires to be dropped, is the verb (*go there now, coming*); that the rest of the two sentences is the same seems to be a selectional demand of the comma connective above. Also, it seems that in this case, permutation to inside the first sentence hardly occurs.

Finally, we come to the repetitive-tag question, which can be analyzed, peculiarly to English, as the comma connective of the *wh* family operating on (1) an assertion and (2) a question of the negation of that assertion, where what the connective takes as repeated is the verb of (1) and (2). We therefore have:

You will go there now, won't you?
 You will, won't you, go there now?
 You won't go there now, will you?
 You won't, will you, go there now?

The second sentence does not have to be a question; but in that case it is the *You'll go, you will* form above. Also, the second sentence, as question, does not have to be a negation of the first. We have, though not frequent: *You're coming now, are you?; You will go there alone, will you?; You aren't coming along, aren't you?* All of these can have the characteristic permutation: *You are, are you, coming now?; You will, will you, go there alone?; You aren't, aren't you, coming along?*

The special semantic effect of the repetitive-tag question can be considered as due to the meaning, noted above, of questioning a negation. In *You'll go, won't you?* there is an assertion paralleled (by comma) by an afterthought

question which indicates concern (surprise, opposition) about the possible negation of it. In *You won't go, will you?* there is a negative assertion paralleled by an afterthought questioning the positive alternative. In both cases, questioning the alternative strengthens the first sentence. In contrast, in *You'll go, will you?* there is an assertion paralleled by an afterthought questioning it, as also in the tag-constant question; therefore in these cases the appended question brings a note of uncertainty about the first sentence.

7. GRAMMATICAL REGULARITY OF THE INTERROGATIVES

7.1. *Indirect Questions*

It has been seen above that the various question forms can be obtained by means of certain transformations, which have been established for the language as a whole (op. cit. in fn. 3), from the non-interrogative form *I ask you whether ...*. These transformations include the intonations of direct speech, 4 (f). Thus the direct question is derived from the indirect. The major properties of direct speech, aside from the intonations, lie in the tense-relation to *N says, asks, requests*, etc., and in the pronouns. To see how these properties arise we note here the relation between *say*, etc., and its object-sentence (i.e. the S_1 in *N says that S_1* , etc.): (a) Every sentence S_1 can be derived from *I say to you that S_1* ; (b) Given that S_1 is an argument of some verb V_0 , the tense in S_1 is determined by an added relative clause *S_1 is before* (or: *prior to*) V_0 , *S_1 is after* (or: *subsequent to*) V_0 , and perhaps *S_1 is simultaneous with V_0* ; (c) When *that* or *whether* introducing an argument of N_1 *says to N_2* (and similarly for *report, ask, request, think*, etc.) is replaced by intonation (period, exclamation, or question) any *N* in that argument which has the same referent as N_1 is replaced by *I*, and any *N* which has the same referent as N_2 is replaced by *you*.¹⁶

The derivation of the direct question, with particular attention to the unfamiliar source proposed here for the tense, is as follows: If we set $S_2 = N_2$ *speak French*, $S_1 = N_1$ *ask N_2 whether S_2 (or ...)*, $S_0 = N_1$ *says to N_2 that S_1* , then we begin with:¹⁷

- (1) ** N_1 says to N_2 that N_1 ask N_2 whether N_2 speak French, where S_2 is subsequent to S_1 , where S_1 is prior to S_0 .*

In *where S_2 is subsequent to S_1* , the S_1 is zeroable as a repetition of what precedes *where*, and the *where S_2* can be pronounced to *which*, and *which* is zeroable: ** N_1 ask N_2 whether N_2 speak French, which is subsequent* \rightarrow ** N_1*

ask N₂ whether N₂ speak French subsequently, which then receives the morphophonemic form **N₁ ask N₂ whether N₂ will speak French*. Note that the sentences produced by each of these successive transformations — the zeroings of *S₁*, etc. — are (when the as yet untensed verbs are nominalized as in fn. 17) possible sentences of the language, even though rare and uncomfortable. In terms of natural speaking, they are transitions within the grammar to the common comfortable sentences.

In this way the tense has entered the deepest-included sentence, on the basis of its time-order to the sentence in which it is contained as argument. We have here obtained:

- (2) **N₁ says to N₂ that N₁ ask N₂ whether N₂ will speak French, where S₁ is prior to S₀.*

Here *S₀* (i.e. its second occurrence) is zeroable, and thereafter

**N₁ says to N₂ that N₁ ask N₂ whether N₂ will speak French, where S₁ is prior*

becomes

- (3) *N₁ says to N₂ that N₁ asked N₂ whether N₂ would speak French.*

All the verbs in *S₁* have here received the past tense — not only the *ask* but also the *will* which had itself been a tense under *ask*. The repetitions of *N₁*, *N₂* can be replaced by pronouns (called ‘third person’), yielding for example:

N₁ says to N₂ that he asked her whether she would speak French.

If any *that S_i* or *whether S_i* is replaced by *S_i* plus intonation (4f), the additional tense which is being placed on *S_{i-1}* (the sentence that contains *S_i* as argument) is not added on top of the tense which *S_i* already carries. Thus, in (2) we can have the change to:

- (4) **N₁ says to N₂ that N₁ ask N₂: Will N₂ speak French?, where S₁ is prior to S₀.*

Here the effect of *S₁ is prior* puts tense only on *ask*, yielding:

- (5) *N₁ says to N₂ that N₁ asked N₂: Will N₂ speak French?*

Under the intonation, the pronouncing is to *I* and *you*, so that (5) becomes:

N₁ says to N₂ that he asked her: Will you speak French?

If we elect the intonation in place of *that* for *S₁*, we obtain from (3):

N₁ says to N₂: I asked you whether you would speak French.

and from (5):

- (6) N_1 says to N_2 : *I asked you: Will you speak French?*

The verbs *say*, *report*, *ask*, *request*, etc., in the present tense with *I* as subject and *you* as object (8.2) can be zeroed if they are not arguments of any operator, and if the *that*, *whether* introducing their argument-sentence has been replaced by intonation.¹⁸ Then if N_1 says to N_2 is the highest operator (of condition (a) above), it is *I say to you*, and (6) becomes:

I asked you: Will you speak French?

If in (1), (2), (4) we had had S_1 is simultaneous with S_0 , then (5) and (6) would have *ask(s)* instead of *asked*, yielding

- (6') *I ask you: Will you speak French?*

In (6') *I ask you* would be zeroable, yielding:

Will you speak French?

The indirect and direct statement, question, and imperative are sentences under *say*, *ask*, etc., with the tense on each verb coming from its time-relation to the verb above it in the sentence-construction, and the pronouns being determined by reference to the nouns above it. The direct forms are obtained from the indirect by replacing the *that*, *whether* by intonations; and they involve the tense and pronoun changes indicated above.

7.2. Question of the Question

The derivations exemplified above indicate why there is no interrogative form for the question of the question. Such sentences can indeed be made, as in

- (1) *I ask you whether I ask you whether she went.*

It is the interrogative form that cannot be repeated. (1) can be transformed into;

- (2) *I ask you whether I ask you: Did she go?*

and even into:

I ask you: Do I ask you: Did she go?

and the first *I ask you* can be zeroed, yielding

- (3) *Do I ask you: Did she go?*

But in (3) the conditions for zeroing *I ask you* are not satisfied.

If in (2) we would want to zero the second *I ask you* we find that here too the conditions for zeroing it are not satisfied (since it is under a higher operator), hence there is no \exists *I ask you whether: did she go?*

7.3. Subordinate Clauses

If we consider the form of the question when it is first argument under *wh*, we find additional evidence for the *ask whether* source of the interrogative. Thus, it may be noted that a subordinate clause cannot occur immediately after the tense-word of a question: *If I say so, will he leave?; Will he, if I say so, leave?; Will he leave, if I say so?* But there is no (1) \exists *Will, if I say so, he leave?* Starting with *He will leave*, we find that *If I say so* can be inserted at each point:

- (2) *If I say so, he will leave.*
He, if I say so, will leave.
He will, if I say so, leave.
He will leave, if I say so.

To each of these, *I ask whether* can be added. If on this we have the transformation from *whether* to intonation, with the tense permuted to before the subject, we obtain:

- (3) *I ask whether if I say so he will leave. →*
I ask: If I say so will he leave?
I ask whether he, if I say so, will leave. →
I ask: Will he, if I say so, leave?
I ask whether he will, if I say so, leave. →
I ask: Will he, if I say so, leave?
I ask whether he will leave, if I say so. →
I ask: Will he leave, if I say so?

The second and third produce identical interrogatives, and we thus see why (1) above is unobtainable.

It has been shown¹⁹ that the subordinate clauses are obtained from the relative-clause *wh* operating on a subordinate conjunction. E.g. *He left because she phoned* is not a direct transform of *His leaving was because she phoned*, but of *He left, which was because she phoned* (i.e. *wh* operating on *He left* and *His leaving was because she phoned*). This yields two possible sources for a question with an appended subordinate clause. In one, the subordinate conjunction operates on the questioned sentence, i.e. on the operand of *ask whether*. Thus, we have *wh* operating on (4a) *He will leave* and (4b) *His (future) leaving is if I say so*. This yields (4) **He will leave,*

which is if I say so, where zeroing of *which is*²⁰ permits the permutation of *if I say so* to all the positions in (2) above. On this operates *I ask whether*, producing the questions of (3), where *I ask*: is zeroable.

The other possibility for subordinate clauses on questions arises from the subordinate conjunction operating on the whole question. This has *wh* operating on (5a) *I ask whether he will leave* and (5b) *My asking whether he will leave is since I am interested*. This yields (5) **I ask whether he will leave, which is since I am interested*, where the zeroing of *which is* permits the permuting of *since I am interested* to all the points of *I ask*:

- (6) *Since I am interested, I ask whether he will leave.* →
Since I am interested, I ask: Will he leave?
I, since I am interested, ask whether he will leave. →
I, since I am interested, ask: Will he leave?
I ask, since I am interested, whether he will leave. →
I ask, since I am interested: Will he leave?

When *I ask*: is zeroed, all of these become identical:

Since I am interested, will he leave?

Transformational changes occur in sentences only as the operators on which they act form those sentences. Hence the *if I say so* cannot be permuted into *I ask whether* of (3), because the latter was not present when *I say so* was permuted in (4) and (2). In contrast, *since I am interested* cannot be permuted into *he will leave* of (6), because *he will leave* had already been operated on, and so closed for further change, when *since I am interested* became available for permuting, in (5). Hence there is no \exists *I ask, if I say so, whether he will leave*, \exists *I ask whether he, since I am interested, will leave* (except in a different connection of *since I am interested*).

7.4. Unzeroed *I ask you*

I ask you:, like *I request you*:, etc., is zeroable only if it is not the argument of an operator, except as first argument of certain subordinate conjunctions). Thus, given *He believes that I ask you whether John is coming*, we have, *He believes that I ask you: Is John coming?*, but not

\exists *He believes: Is John coming?*

Also, the interrogative forms do not occur after many conjunctions: we have no

\exists *He will leave while: Is John coming?*

but the source forms occur here: *He will leave while I ask you whether John is coming, He will leave while I ask you: Is John coming?* And in most situations the interrogative forms occur under *and*, *or* only if the other sentence under the conjunction is also in the interrogative (or imperative) form: we have no

‡ Is John coming and I found the book

but the source forms are not restricted: *I ask you whether John is coming and I found the book.*

The importance of all this is not only that we can say that while interrogatives are restricted their transforms are not, but that we can say that what is restricted are the zeroing and other changes. That is to say, the source forms are not restricted. The source forms can undergo certain transformational changes – zeroings, permutations, intonations – which change them into the interrogative forms. These changes have specific conditions e.g. that they cannot be made after their sentence has been operated on by a further operator, or the condition above for zeroing *I ask you:*, etc. Thus the restriction does not have to be stated as a property of certain sentences (interrogatives), but as a condition on certain transformational changes. This gives quite a different view of grammatical formulation.

8. THE GRAMMATICAL STRUCTURE OF THE WHOLE LANGUAGE

The analysis of interrogative forms presented here fits without special conditions into a general theory of grammatical structure. This theory holds that the sentences of a language can be fully described by two operations, the second acting on the first, each of which directly produces actual sentences.

8.1. *Operators*

The first operation is the formation of a sentence by the ordered entry of words. Each entering word of class A is characterized as requiring the presence (i.e. prior entry into the sentence) of a sequence of words of classes B, ... D, which have been defined without reference to A or to subsets of A. The word of A is called the operator, and the words of B, ..., D its ordered arguments. The sentence is formed by the operator occurring in a fixed position in respect to its arguments – in English, after the first argument-position.

In many cases, words which are arguments under a given operator receive an indicator of their argumenthood. When the argument is itself an operator the indicator on it is *-ing, that, whether*, etc., as in *I believe that John stayed* (where *John stayed* is second-position argument of *believe*, with *I* as first).

This condition requires that each word in the language be classifiable in respect to its particular requirements as to the presence of other words in the sentence – in practice its immediately prior enterers in the construction of the sentence. It follows that there must be (1) a class of words, called “elementary arguments” (mostly, concrete nouns, e.g. *man*, *John*), whose argument set is empty; and (2) classes of words, called “elementary operators” (mostly, concrete verbs, e.g. *stay*, *fall*), whose arguments are only elementary; and (3) classes of words (“non-elementary operators”, e.g. *ask*, *believe*) whose arguments are sequences of operators and possibly elementary arguments. Then *John stayed*, *I believe John stayed* are sentences:²¹ in the latter, *believe* requires the presence of an elementary argument and an operator, i.e. words of the classes of *I*, *stay*, in that order; and *stay* requires an elementary argument, i.e. a word of the class of *John*. Since this is the only necessary condition (with perhaps a few arbitrary local restrictions on certain small subsets of words), the word-classes are not restricted beyond the properties in (1)–(3) above; and all or virtually all word-sequences formed in this way are possible sentences of the language. Thus, the grammar of these sentences contains virtually no restrictions, beyond the membership of words in particular requirement-classes. As has been seen, the source-sentences with *I ask whether* above could be constructed under all conditions, and it was only the reduced interrogative forms (see below) that were unavailable in one case or another.

However, there are inequalities of likelihood for a given operator word to occur with particular argument words. As the sentence is built up, these operator-argument inequalities, and certain properties of them, determine the likelihood of a sentence to occur, and the nonsensicality or naturalness of rare sentences when they do occur, and so on. The likelihoods may be due to semantic, stylistic, and historical factors. While they cannot be directly measured, they can be estimated by speakers of the language, at least in respect to gross differences. And while they are changeable with time, there are two permanent linguistic relations (really, two aspects of a single linguistic process) which can be formulated with their aid. One is that the transformational relations between sentences holds for the corresponding sentences of two sentence sets which have approximately identical likelihood-ordering of sentences (section 0): i.e. transformation preserves likelihood-ordering among sentences. The other is that reduction in shape, which is by far the main kind of transformation, occurs in operators and arguments which have an extremely high likelihood of occurring, either absolutely or in respect to each other: i.e. ones whose presence in the construction of their sentence contributes little or no information to the sentence.

8.2. *Reductions*

The second operation is the reduction in shape or in separation²² of certain operator words or their argument words on the condition that the operator has exceptionally high likelihood – or low information – in respect to its argument-words (or perhaps in a few other conditions also). This reduction is in almost all cases optional, and takes place as the operator is entering upon the arguments, into the sentence. This last is a major simplification for the grammar, for it means that a reduction in a sentence – which in fact is a reduction in an operator or argument word – takes place only when the given operator is the last-entering (highest) operator of the sentence, and before any further operator acts on it; a few reductions are delayed until their required conditions are satisfied by later operators or reductions in the sentence-construction. In 5.3, 5.4, and 7.3 above, a number of cases were seen where given reductions to interrogative forms did not take place because of this condition. A language may contain some transformations other than these reductions, but not many such.

By its very nature, reduction – or transformation – preserves the inequalities of operator-argument combination, and the meaning of the sentence; and hence is approximately paraphrastic. It is based on the likelihood-property used in the practical criterion for transformations given in the introductory paragraphs of this article.

This second operation, acting on many of the sentences produced by the first operation, produces in addition to them the remaining sentences of the language. The sentences produced by the first operation alone contain virtually no restrictions, and contain all the substantive information in the language (since the reduction is approximately paraphrastic). The sentences produced by the second operation contain restriction in domain, i.e. as to which operators or arguments receive which reduction; but the restrictions are determined almost entirely in respect to their immediate arguments or operators.

In the derivation of the interrogative forms from the *ask whether* forms, we specify (1) the reduction of *whether* to question intonation (the dropping of the *wh*-variant being precluded by its pronominal attachment); (2) the permutation of the tense (which is one of a number of similar permutations which do not seem to be related to low information); and (3) the zeroing or pronouncing and attendant permutation, under the *or* and other conjunctions (which is common to the whole grammar). What remains to be explained is the zeroing of N_1 *ask* N_2 , or of one member of this family. When *whether ... or ...* is reduced to *... or ...?* under *John asked Mary, They will ask him, I wonder*, etc. these different operators with their different first arguments

each bring a particular information to the sentence: *John asked Mary: Is Carl coming?* (← *John asked Mary whether Carl is coming.*), *They will ask him: Is Carl coming?*, *I wonder: Is Carl coming?* all say different things. One member of this set of operators-plus-first-arguments, namely *I ask you* (in present tense), brings no information, because for a speaker to say to a hearer *I ask you: Is Carl coming?* constitutes his asking the question of his audience, and carries thus the same information as his saying to that hearer merely *Is Carl coming?* In a manner reminiscent of the performatives, therefore, *I ask you* is uniquely informationless before a sentence with question intonation (which is the last argument of the *ask*); and it is zeroable.

We have thus seen that not only are the interrogative forms transformationally derivable from non-interrogative *ask whether* forms, but that a general theory of grammatical structure leads directly to the restricted interrogative forms as reductions from non-restricted *I ask you whether* plus a disjunction of sentences.

9. INTERPRETATION

The syntactic derivation presented here leads to a number of interpretations about the question. Some will be noted here with a barest mention.

One is that it is not the question, but only its interrogative transform, that is restricted in form and in combinability, i.e. in textual neighborhood. For the source forms are not restricted: we may not be able to say *I'm not sure of my plans before: Are you going home?*; but we can say *I'm not sure of my plans before I ask you: Are you going home?* (which is presumably what we would have meant if we had said the former sentence). What is restricted are the reductions leading to the interrogative form; but these are paraphrastic and do not limit the environments in which questions – in their source – can be asked.

Another point to note is that the question turns out to be not a primitive major category of language or grammar. It is the resultant of an operator with arguments partly similar to those of *wonder*, *tell*, *request*, etc., and partly different from each of these. Even its peculiar performative property, which permit the zeroing of *I ask you* (8.2), is not unique to it. For example, *I request you* (or *I command you*) is similarly zeroable in the reductions to the imperative form: *I request you that you please go* → *I request you: Please go!* → *Please go!* All of these non-assertion forms are not primitive to language structure in terms of the theory sketched above. They are all derivable in a straightforward way from assertions, which turn out to be the only primitive sentence form.

Lastly, a number of related questions in the philosophy of language are elucidated by the derivation given above. For example, the problem of what is the truth value of a question can be answered (perhaps a bit flippantly, but yet syntactically) by saying that its truth-value is always T: it is the truth of the fact that the question has been asked. In any case, it does not involve the truth-value of the sentence which is being asked, i.e. which has been put into the interrogative form.

NOTES

¹ For convenience, the details in this discussion will be peculiar to English. However, the essential analysis holds for other languages in which this analysis has been tested. I take this opportunity to thank Henry Hiz for major comments on the material of this paper, leading to many improvements in it.

² The "approximately" is intended to cover both small differences in investigative results, and also the exclusion of characterizable subsets of n -tuples (e.g. all those having a particular verb as main verb, i.e. last operator) from one or the other of the sentence sets. For the definition, see the writer's 'Co-occurrence and Transformation in Linguistic Structure', *Language* 33 (1957) 283-340; and *Mathematical Structures of Language*, p. 59, Interscience Tracts in Mathematics 21 (Wiley, New York 1968). The linguistic processes that create these transformations are indicated in section 8 below.

³ Cf. the writer's *Notes du Cours de Syntaxe* (M. Gross, ed.) (Éditions du Seuil, Paris, 1975). Below, \nexists is used for ungrammatical; * for very rare or uncomfortable, or lacking a small morphophonemic change; $S_2 \leftarrow S_1$ indicates that S_2 is a transform of S_1 .

⁴ *Ibid.* III 1.

⁵ In French, the agreeing (positive) answer to a positive question is *oui*, while the disagreeing answer to a negative question is *si*. Since *si* also contradicts a negative statement, we can say that *si* is a negative operator operating on and referring to a negative, and obtains its positive import (as double negative) from the fact that the referred-to negative is, in the basic form, contained (i.e. cited) as object of the disagreeing (negative) operator.

⁶ The pronouncing and zeroings differ somewhat in the *whether* form. Thus we can have *I ask you whether John will stay or will go*, but not \nexists *I ask you: Will John stay or will go?*

⁷ In all cases above, *or* could be replaced by *or alternatively*; that is, *or* under *ask whether*, *wonder whether*, is a transform of *or alternatively*. Under *doubt*, *below*, and similar verbs, we may indeed find *or*, but there it is a transform of *or also*, *or for that matter*: *I doubt whether John will stay or (for that matter) do more than just say hello*. This latter *or* cannot be followed by a negation of its preceding sentence: there is no \nexists *I doubt whether John will or will not stay*. Only the *or* which is a transform of *or alternatively* is purely disjunctive.

⁸ The verbs *know*, *remember*, and the like can have their sentential objects introduced not only by *that*, but also by *whether* plus purely disjunctive *or*; but the latter cannot be replaced by the question intonation: (1) *I know whether he will go or not*; (2) \nexists *I know: Will he go?* However, given an appropriate zeroable intermediate operator the intonational transform is available: e.g. (3) *I know the alternative (or: option) as to*

whether he will go or not: (4) *I know the alternative (or: option): Will he go?* Thus here too the *whether* plus disjunctive *or* could be replaced by question intonation. The only difference is that the word which introduced the *whether* (i.e. *alternative*, etc.) could be zeroed in (3) above, but not if the *whether* has been replaced by intonation (i.e. not in (4) above). Hence (1) above exists, but (2) does not.

⁹ The relation of *wh*-pronouns to disjunction is also seen in the following case: In (1) *He knows whether John or Carl did it but he won't say who did it* there can be zeroing to (2) *He knows whether John or Carl did it but he won't say who* (where *who* is equivalent to the disjunction expressible by *which of them*) whereas in (3) *He knows whether John did it but he won't say who did it* there is no zeroing to (4) *He knows whether John did it but he won't say who*. That (4) does not exist follows directly if we understand that *who* (or *-o*) is a pronoun for a disjunction and not a pronoun for the preceding *John*. Then in (3) the second *did it*, whose subject is the pronounced disjunction *-o*, cannot be zeroed as repetition of the first *did it*, whose subject is *John*. This is so because, by the general conditions for zeroing: in $X_1 Y_1$ and $X_2 Y_1$ the second Y_1 is zeroable only if it has the same grammatical relation to X_2 as the first Y_1 has to X_1 . In (1), both cases of *did it* have disjunctive subjects (the pronoun *-o* for the second); hence the second *did it* is zeroable, as in (2).

¹⁰ Op. cit. in fn. 3, II 7.

¹¹ The syntactic analysis of interrogative forms presented here is given in the writer's 'Transformational Theory', *Language* 41 (1965) 363–401 §5.213; and *Papers in Structural and Transformational Linguistics*, p. 662 (Reidel, Dordrecht 1970), in which volume the articles cited here are reprinted.

¹² Ibid. III 1.4.

¹³ Note that this is not due to the verb *marry* in itself. The question is more comfortable in *What did the priest do to the couple?* for *The priest married the couple*.

¹⁴ For the source of this limitation on *wh*-pronouns, see op. cit. in fn. 3, II 7.

¹⁵ Compare French *pourquoi* as against English *why*.

¹⁶ Op. cit. in fn. 3, III 1.4 for (a), IV 2 for (b), III 1.1 for (c). *I* and *you* are simply 'same as subject and object respectively, of the *say, ask*, etc. operator above'.

¹⁷ The verb-forms after the first are initially untensed here, in a way that can be said in English only if we began with N_1 reports to $N_2 N_1$'s asking N_2 as to N_2 's speaking French (or ...).

¹⁸ Op. cit. in fn. 3, III 1.4.

¹⁹ Ibid. IV 3.3.

²⁰ Ibid. III 1.3.

²¹ The form of the tense is not discussed here because it is due to the second operation presented below. The whole grammatical formulation is given in op. cit. in fn. 3, and the writer's 'A Theory of Language Structure', *American Philosophical Quarterly* 13 (1976) 237–255.

²² Op. cit. in fn. 3, III 2.4, 5.