On the Felicity Conditions of Disjunctive Sentences

Mandy Simons

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Mandy Simons

Department of Philosophy

Carnegie Mellon University

0. Introduction

In "Indicative Conditionals", Grice (1989: 68) observes that:

> A standard (if not the standard) employment of "or" is in the specification of possibilities (one of which is supposed by the speaker to be realized, although he does not know which one), each of which is relevant in the same way to a given topic. 'A or B' is characteristically employed to give a partial answer to some [wh]-question, to which each disjunct, if assertible, would give a fuller, more specific, more satisfactory answer.

As illustration, consider sentence (1):

(1) Either you have dirt in your fuel line or your carburetor is gummed.

Your mechanic might say this to you in response to your asking, "What is wrong with my car?". You would understand that each disjunct constitutes what, from your mechanic's perspective, is a possibly true answer to the question. Of course, you wouldn't have to have asked the question explicitly in order to elicit (1). If you had dropped the car off in the morning and called in the afternoon, your mechanic might offer (1) even before you had the chance to ask the question. In that case, the question is nonetheless implicit; the issue of what is wrong with your car is clearly a live one between you and your mechanic.

Not only is it typical for disjunctions to be used to list related possibilities, but it is apparently necessary. A disjunction which cannot be interpreted in this way is generally quite unacceptable, as illustrated by the following:

(2) #Either you have dirt in your fuel line or it is raining in Tel-Aviv.

(2) would certainly be an infelicitous response to your question, "What is wrong with my car?" Moreover, it is hard to think of any situation in which (2) could be felicitously uttered. To make it felicitous, we would need to concoct some connection between the mechanical state of your car and the

weather in Tel-Aviv. Unless we can, (2) remains infelicitous. So disjunctions not only may be used, as Grice says, to list a series of possibilities, "each of which is relevant in the same way to a given topic", but must be so used. The goal of this paper is to explain why this is so.

The paper will, in fact, present two different but related accounts. In sections 1 and 2, I will set out the account which I formulated in my dissertation (Simons 1998). This is what I will call an *information-based* account, its central claim being that it is only when disjunctions are interpretable as listing possible answers to a given question that they can provide information which is useful to a hearer. In section 1, I will focus on the case of disjunctions given in answer to an explicit question, and will address the question of why, in such a case, each disjunct must be interpretable as a possible answer to that question. I will then go on, in section 2, to argue that the generalizations made can, at least to some extent, be extended to non-answer uses of disjunction by adopting a view of discourse in which every assertion is seen as being the answer to some question, either explicit or implicit.

In section 3 of the paper, I will suggest that the failure of informativity associated with many infelicitous disjunctions is really a by-product of a more basic failure, namely, a failure of *evidence*. This will lead to a somewhat different account of the felicity conditions, and one which avoids some of the difficulties faced by the first. The second account is *evidence-based*. The central claim here is that disjunctions are judged infelicitous when, in the judgement of the hearer, it is not possible for the speaker to have the appropriate kind of evidence for the assertion of the disjunction. As I will show, many cases in which a disjunction is supported by appropriate evidence turn out to be cases in which each disjunct is an answer to a given question.

The discussion here will be limited almost entirely to cases of clausal disjunction, although some of the observations apply to phrasal disjunctions also. I will assume throughout that *or* has the truth conditions of inclusive disjunction; this assumption will be fundamental in both of the accounts I present.

1. Disjunctive Answers

My first step, then, is to look at disjunctions given in answer to an explicit question. The claim I will make is quite simple: a disjunction can provide an answer to a question Q only if all of its disjuncts provide possible answers to Q. To make this point precisely, I will adopt Groenendijk and Stokhof's (1984) formalization of the question/answer relation which relies, in turn, on their semantics for questions. I will present the relevant aspects of their theory

in section 1.1. In section 1.2., I will demonstrate the truth of my claim, and will discuss what this has to do with the felicity conditions on disjunctions.

1.1. Groenendijk and Stokhof (1984): The Semantics of Questions and the Pragmatics of Answers.

Groenendijk and Stokhof propose an analysis of questions within a possible worlds framework, following an approach which originates with Hamblin (1973). Hamblin's original insight was that questions denote sets of possible answers, that is, sets of propositions which constitute possible answers to the question. Based on issues relating to the interpretation of embedded questions, Groenendijk and Stokhof (1982) argue that the extension of a question at a possible world is that proposition which constitutes a true and exhaustive answer to the question at that world. The intension of a question, then, is a function from worlds to propositions: for each world, the function gives the proposition which is the true and exhaustive answer at that world.

An alternative but equivalent way to characterize the intension of a question is as a set of propositions, where each member of the set is the true and exhaustive answer to the question at some world. For example, the semantic value of the question *Is it raining in Tel-Aviv?* is the set containing the proposition that it is raining in Tel-Aviv and the proposition that it is not raining in Tel-Aviv. At any possible world, the true and exhaustive answer to this question is given by one of these propositions. In other words, these are the only two possible answers to the question.

In general, a yes/no question will have as denotation a two-membered set of propositions: basically, the "yes" answer and the "no" answer. (The exception to this is where the question is tautological or contradictory, when there will be only one possible answer to it.) The semantic value of a *wh*-question, on the other hand, will generally have many members, as there are generally many possible exhaustive answers to a wh-question.

Groenendijk and Stokhof identify propositions with sets of possible worlds, so instead of thinking of the denotation of a question as a set of propositions, we can think of it as a set of sets of possible worlds. Moreover, because each answer in the denotation is an exhaustive answer, the sets of possible worlds are non-overlapping. To see why this is so, consider two possible answers to the question *Who came?*: George came (and no one else did), George and Jane came (and no one else did). The qualifications in parentheses are needed because the answers we are interested in are exhaustive answers. Now, if it is true that George and Jane and no one else came, then it is not true that George and no one else came. If the first of these propositions is true at some world, then the second is false, and vice versa. The same will be true for any two exhaustive answers to a given question.

The denotation of a question, then, divides up the set of possible worlds into a number of non-overlapping subsets, with each subset representing a possible exhaustive answer to the question. In other words, the denotation of a question is a *partition* on the set of possible worlds. For any question Q, the denotation of Q is represented as W/Q, the partition imposed by Q on W. Figure 1 represents one possible partition for a very small set of possible worlds W = {a,b,c,d,e,f,g}.

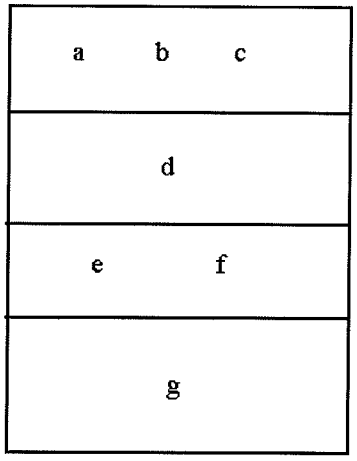

Figure 1

The cells of the partition imposed on W by a question represent what Groenendijk and Stokhof call the *semantic answers* to the question. But they (and we) are interested in a more general notion of answerhood. Clearly, what counts as an answer to a question in an actual discourse context is dependent to a large extent on the state of information of the questioner, what the questioner already takes to be true. Consequently, Groenendijk and Stokhof define a number of notions relating questions as semantic objects to states of information. I set out below those notions which will be useful here. In some cases, I have modified either the notation or the terminology that Groenendijk and Stokhof use, but the treatment is basically theirs.

I follow Groenendijk and Stokhof in assuming a very simple notion of "state of information". I will take a state of information to be a set of propositions or, alternatively, one complex, conjoined proposition. I will assume that this complex proposition is non-contradictory. Given the possible-world perspective adopted here, that means that an information state can be treated as a set of possible worlds, a subset of W. Beyond this, I do not want particularly to try to elaborate on what exactly an information state is.

In this kind of framework, information update is reflected formally by a change in the set of possible worlds which represents the information state. An assertion has the effect of increasing the propositions which the hearer

accepts, thereby eliminating some worlds compatible with those propositions. (If A asserts that p, and her hearers accept that assertion, then worlds in which ~p is true are no longer compatible with the hearers' information states.) The worlds compatible with the new information state are those worlds in the intersection of the previous information state and the proposition asserted, also conceived as a set of possible worlds. Formally, information update is represented as proceeding via set intersection. An assertion p which is accepted by a discourse participant changes that participant's information state from c to $c \cap p$.

A question, we have now said, imposes a partition on the set of possible worlds W, each cell of which constitutes a possibly true answer to that question. The information state of a discourse participant (henceforth, a *participant,* or *speaker*) may itself, though, rule out certain possible answers. Suppose, for instance, that a participant asks, *Who came?*, but already has the information that the only people who might have come are George and Jane, all other possibilities having been eliminated. In this case, there are only three "live" answers to the question: that only George came, that only Jane came, and that only George and Jane came. The set of possible answers to a question Q compatible with an information state c, W/Q^c, is defined as follows:

(3) $W/Q^c = \{X : X \in W/Q \ \& \ X \cap c \neq \varnothing\}$

Thus, given the information state described above, $W/\textit{who came}^c$ will have only three members: the set of worlds in which only George came, the set of worlds in which only Jane came, and the set of worlds in which only George and Jane came. No other members of W/*who came* are compatible with c.

Using this definition, we can define two further notions: the notion of being a *proper question* with respect to an information state, and the notion of a question being resolved in an information state. A question Q is proper in an information state c iff more than one possible answer to Q is compatible with c. This definition is given formally in (4).

(4) Q is a proper question w.r.t c iff $|W/Q^c| > 1$

(4) says that Q is a proper question with respect to c iff W/Q^c (the set of answers compatible with c) has more than one member. This situation is illustrated in Figure 2.

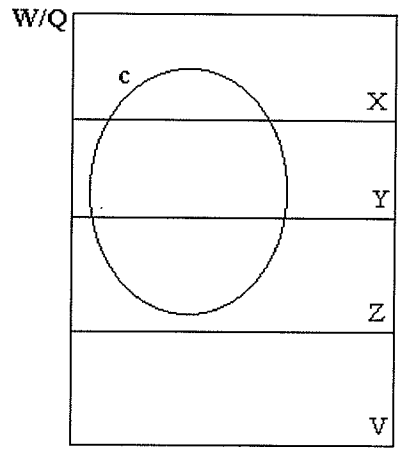

Figure 2
Q is a proper question in c
$W/Q^c = \{X,Y,Z\}$

In this figure, as before, the large rectangle represents the set of worlds W, partitioned as determined by the question Q. Each cell in the partition corresponds to a possible answer to Q. The circle c is the information state of a given discourse participant (a subset of W). Note that c overlaps with three of the cells of W/Q, the cells X, Y and Z. In other words, three possible answers to Q are compatible with the current state of information of the discourse participant. So Q is a proper question in c.

The next notion to define is that of a question being *resolved* by an information state. I will say that a question Q is resolved by c when only one possible answer to Q is compatible with c. Formally:

(5) Q is resolved by c iff $|W/Q^c| = 1$

This situation is illustrated in Figure 3[1].

1. Note that when c is the empty set, then for any Q, W/Q^c is the empty set too. Given my definitions, Q is neither proper nor resolved in such an information state. However, an empty information state does not correspond to any relevant situation, so I set aside any consequences of this possibility.

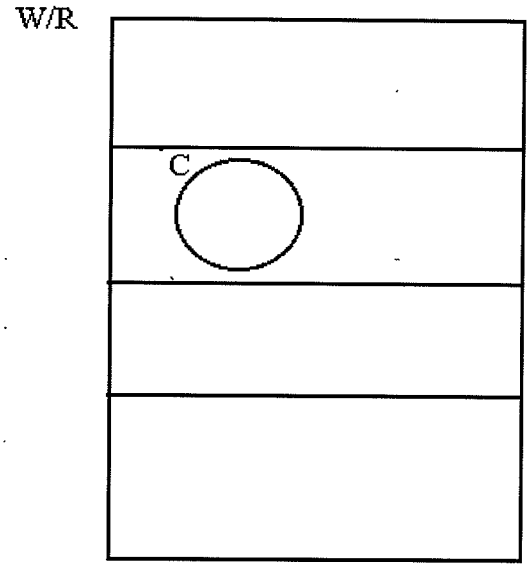

Figure 3
R is resolved by c

With the help of the definitions above, I can now characterize *partial* and *complete* answers to Q. To give a partial answer to a question Q is to give the questioner information which changes her information state in such a way as to eliminate some possible answer to Q. Formally, this corresponds to changing the questioner's information state so that its intersection with some cell of the partition becomes empty. A proposition φ thus partially answers a question Q with respect to an information state c iff fewer possible answers to Q (i.e. fewer cells of W/Q) are compatible with the result of updating c with the content of φ than are compatible with c. To denote the information update operation, I will adopt Heim's (1982) "+" notation. The result of updating c with φ is written "$c+\varphi$". The formal definition of a partial answer is as follows:

(6) A proposition φ partially answers a question Q with respect to c iff $W/Q^{c+\varphi} \subset W/Q^{c}$

To give a complete answer to a question is to eliminate all but one of the possible answers to that question i.e.

(7) A proposition φ completely answers a question Q with respect to c iff Q is proper with respect to c and is resolved by $c+\varphi$.

1.2. Disjunctions as answers

When we answer a question with a disjunction, it will count as an answer only if it succeeds in doing what an answer must do, that is, reducing the hearer's information state in such a way as to eliminate some possible answer to that question. We will now be able to see quite straightforwardly why, in order for a disjunction to do this, each disjunct must constitute a possibly true answer to the question asked.

Suppose Jane asks her mechanic, *What is wrong with my car?*, and her mechanic replies:

(8) Either you have dirt in your fuel line or it's raining in Tel-Aviv.

Let c be Jane's information state at the time she asks the question. The result of updating c with the content of (8) will be to eliminate any worlds in which it is the case neither that there is dirt in the fuel line nor that it is raining in Tel-Aviv. The elimination of such worlds will not, though, get Jane any closer to resolving her question. For it is not the case that all worlds in which there is dirt in the fuel line will be eliminated. Nor is it the case that all worlds in which some other possible fault with the car will be eliminated. In other words, although (8) may convey some information to Jane, it does not convey information which eliminates any possible answer to the question she has asked. This is represented pictorially in Figure 4 (see next page), where the solid oval represents Jane's starting information set c, and the dotted oval represents the information state which she reaches by updating with (8). Figure 4 represents a situation in which Jane's original information state already excluded some possible answers to the question. Updating with sentence (8), although it results in the elimination of *some* worlds from the context, does not exclude any further answers. So (8) fails to be an answer to the question asked.

W/what is wrong with my car

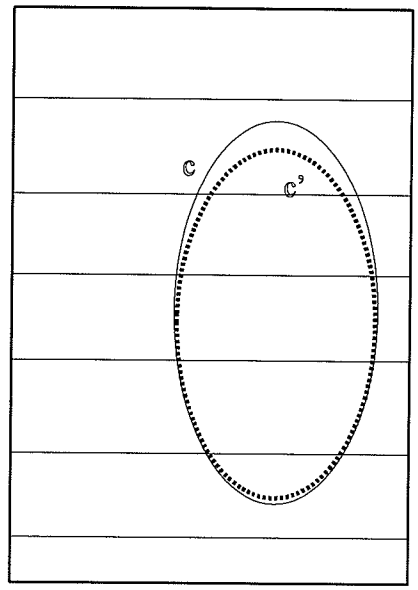

Figure 4

In fact, it is possible for a disjunctive sentence to provide a partial answer to a question only when each disjunct provides a partial answer: only when, as Grice puts it, "each disjunct, if assertible, would give a fuller, more specific, more satisfactory answer [to the question asked]." This can be proved quite straightforwardly. Recall that a proposition φ provides a partial answer to Q iff the set of answers to Q compatible with c+φ is a proper subset of the set of answers to Q compatible with c. The following then turns out to hold:

(9) For any information state c and any question Q:

$$W/Q^{c+[A \text{ or } B]} \subset W/Q^{c} \text{ only if}$$
$$W/Q^{c+A} \subset W/Q^{c} \text{ and } W/Q^{c+B} \subset W/Q^{c}$$

i.e. a disjunctive proposition *A or B* can provide a partial answer to Q only if both A and B provide partial answers to Q. The result falls out from the definitions given by virtue of the fact that the result of updating a information state c with a sentence A or B is the intersection of c with the union of (the set of worlds denoted by) A and (the set of worlds denoted by) B. The proof, which requires only simple set theory, is given in (11). The proof uses the lemma in (10):

(10) Lemma:
$W/Q^{c+\varphi} \subset W/Q^c$ iff $\exists X \in W/Q$ s.t. $X \cap c \neq \varnothing$ and $X \cap c \cap \varphi = \varnothing$

(11)

1. Show: for any Q, any c:
$W/Q^{c+[\varphi \text{ or } \psi]} \subset W/Q^c$ only if
$W/Q^{c+\varphi} \subset W/Q^c$ and
$W/Q^{c+\psi} \subset W/Q^c$

2. Suppose that for some arbitrary Q and c,
$W/Q^{c+[\varphi \text{ or } \psi]} \subset W/Q^c$

3. Then $\exists X \in W/Q$ s.t. $X \cap c \neq \varnothing$ and $X \cap c \cap [\varphi \text{ or } \psi] = \varnothing$
(by lemma, L to R)

4. $X \cap c \cap [\varphi \text{ or } \psi] = X \cap c \cap (\varphi \cup \psi)$

5. So $\exists X \in W/Q$ s.t. $X \cap c \neq \varnothing$ and $X \cap c \cap [\varphi \cup \psi] = \varnothing$
(rewrite of line 3)

6. So $\exists X \in W/Q$ s.t. $X \cap c \neq \varnothing$ and $X \cap c \cap \varphi = \varnothing$ and
$\exists X \in W/Q$ s.t. $X \cap c \neq \varnothing$ and $X \cap c \cap \psi = \varnothing$

7. So $W/Q^{c+\varphi} \subset W/Q^c$ and
$W/Q^{c+\psi} \subset W/Q^c$ (by two applications of lemma, R to L)
i.e., φ is a partial answer to Q and ψ is a partial answer to Q.

This result answers the first of our questions: why, when a question is answered with a disjunction, does each disjunct always look like a possible answer to a that question? The answer is that it is only when each disjunct constitutes a possible answer that the disjunction as a whole can do so. In (12), A's response is infelicitous because it fails to give even a partial answer to the question asked.

(12) Q: What is wrong with my car?
A: Either there is dirt in the fuel line or it's raining in Tel-Aviv.

Certainly, A's response seems infelicitous not only as a response to the question, but as a disjunction. I will argue in the next section that this is because we cannot, offhand, come up with *any* situation in which a question would arise to which both disjuncts would constitute possible answers. However, let me set this aside for now, and concentrate on the infelicity of disjunctions of certain kinds as answers to explicit questions. Below, we'll see a case in which a disjunction appears infelicitous in the context of one

question, but quite acceptable in the context of a different one, which will justify adopting this viewpoint.

Implicit in the discussion above is the assumption that a response to a question is felicitous only if it is an answer to that question. This is clearly inaccurate. There are at least two other ways to respond felicitously to a question. One is to explicitly refuse to answer: to indicate that you are either unable or unwilling to answer the question asked. Another option is to establish or suggest a *strategy* for finding an answer to the question asked. (For discussion of this, see Ginzburg 1995 and Roberts 1996). One way to do this is to ask a related question, as in (13). (See Groenendijk and Stokhof (1984) for a discussion of what it is for two questions to be related.)

(13) Q_1: What's for dinner tonight?
Q_2: Was it tofuburgers last night?

Q_2 is felicitous only if there is known to be a connection between it having been tofuburgers last night and what it will be tonight. If the responder wants to make this connection known, she might choose a response like (14), which indicates that another question -- whether it was tofuburgers last night -- is relevant to the original one, and thereby introduces that question into the discourse:

(14) Q: What's for dinner tonight?
R: If it was tofuburgers last night, it'll be stir-fry tonight.

As Ginzburg (1997) observes, in actual discourse the discussion of a single question may stretch over multiple talk-turns, as participants pursue some strategy of question-resolution. The class of felicitous responses to a given question, then, is not limited to the class of (partial) answers to the question.

However, it is clearly also not the case that any response to a question is felicitous. A response must, in some sense, be relevant. In particular, an assertoric, non-conditional response to a question *does* have to be an answer to count as felicitous, unless it can be interpreted as a refusal. An assertoric response to a question provides the questioner with information, allowing her to update her information state. And if an assertoric response is to be felicitous, it must enable her to update her information state in a particular way: it must provide at least a partial answer to the question asked. In other words, a felicitous response to a question need not be informative; but if it is informative, it must be relevantly so. Let me characterize this as a constraint on responses to questions:

(15) *The Relevant Informativity Constraint*
An assertoric response to a question is felicitous only if it is relevantly informative i.e. only if it provides at least a partial answer to the question asked.

As discussed above, a partial answer is one which eliminates some possible answer to the question[2].

Notice that an assertion can satisfy the Relevant Informativity Constraint without being what we might call a direct answer. Here is an example:

(16) Q: What's for dinner tonight?
A: Well, it was tofuburgers last night.

Suppose that it is generally known that if it was tofuburgers last night, it won't be tofuburgers again tonight. This, then, will be reflected by Q's information state. Any world in this set in which it was tofuburgers last night will be one in which it is not tofuburgers tonight. Updating such an information state with the content of A's assertion thus leaves only worlds in which it is not tofuburgers tonight. The response, then, is informationally equivalent to (17):

(17) A': It's not tofuburgers.

and so constitutes a partial answer to the question. (The preference for A over A' may be that the former also provides justification or evidence for the answer.) Relevant Informativity, then, can be satisfied in somewhat indirect ways.

1.2.1 Further failures of felicity

Let's go back, now, to disjunctive answers to questions. It turns out that failure to satisfy Relevant Informativity is not the only thing that can go wrong with such answers. Something also goes wrong when the disjuncts are too similarly related to the question asked. Consider:

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2. This formulation does not include the caveat that the constraint does not apply to assertoric responses which are interpretable as refusals, like those in (i) and (ii):

(i) Q: Where's Jones?
A: I don't know.

(ii) Q: Where's Jones?
A: She doesn't want to see you.

These assertoric responses are not Relevantly Informative in the sense defined, but they are felicitous (if unhelpful) responses to the question.

(18) Q: What kind of vehicle does Jane drive?
A: Either she drives a truck or she drives a Chevy truck.

Again, the response looks straightforwardly unacceptable, not merely as a response to the question asked, but simply as a disjunction. But once again, I want to concentrate on what is wrong with it as a response.

Unlike the response in (12), this disjunction does provide a partial answer to the question asked. Let c be the starting information state of the questioner. Updating c with the content of the response will result in the elimination from c of any worlds in which Jane drives neither a truck nor a Chevy truck: what will be left are only worlds in which Jane drives a truck, either a Chevy or something else. So clearly the questioner will be a lot closer to an answer than she was before.

What, then, goes wrong? Well, notice that to get Q to the information state she reaches, A could just as well have responded with:

(19) She drives a truck.

The second disjunct of (18)A entails the first. Every world in which Jane drives a Chevy truck is one in which she drives a truck, so the proposition expressed by the second disjunct (i.e. the set of worlds at which this proposition is true) is a subset of the proposition expressed by the first. The result of updating any information state with the disjunction is thus identical to the result of updating with the first disjunct alone. The second disjunct makes no contribution to the informativity of the assertion.

The violation involved here presumably falls somehow under Grice's Maxim of Manner (Grice 1967). That maxim tells us simply: Be perspicuous. Just what is required for perspicuity is hard to say, but it seems reasonable that vacuous operations should be ruled out. Speakers should not require hearers to perform processing operations which do not lead to any informational gain. I will call this requirement the *Non-Vacuity Constraint*:

(20) *Non-Vacuity Constraint*
The output of any logical operation in the interpretation of an utterance must differ in informativity from any input to the operation.[3]

I assume that the interpretation of disjunction involves performing a logical operation equivalent to Boolean join. The Non-Vacuity Constraint thus

3. This imperative is of the same nature as the imperatives in Grice's Maxims, an imperative which every participant in a discourse will assume the other participants to follow. Hence the puzzlement of a hearer faced with an utterance which violates Non-Vacuity.

requires that the output of the join operation on two or more disjuncts differ in informativity from any of the disjuncts.

Let me clarify what I mean by "differ in informativity." For reasons that will become apparent in the next section, I do not want to restrict differing in informativity to differing in semantic value. However, I take it that differing in semantic value is a necessary condition for differing in informativity. Minimally, two sentential expressions must differ in semantic value in order to differ in informativity. On the possible world view adopted here, that means that two sentential expressions must denote two different sets of possible worlds in order to differ in informativity[4]. We can now see clearly why the "entailing disjunction" I discussed above violates the Non-Vacuity Constraint: Here is the example again:

(21) #Either Jane drives a truck or she drives a Chevy truck.

The set of worlds in which Jane drives a Chevy truck is a subset of the set of worlds in which Jane drives a truck. The union of these two sets is thus identical to the first argument. Hence, the semantic value of the output is identical to the semantic value of one of the arguments of the operation. This means that the disjunction has the same degree of informativity as one of its disjuncts.

The definition of Non-Vacuity is also intended to extend to phrasal disjunctions like (22):

(22) #Jane drives either a truck or a Chevy truck.

Once again, it suffices to observe that the semantic value of the disjunction is identical to the semantic value of one of the disjuncts. Assuming a Generalized Quantifier treatment of the DPs, the denotations of *a truck* and *a Chevy truck* will be as in (23):

(23) $[\![a\ truck]\!] = \{X: X \cap [\![truck]\!] \neq \varnothing\}$
$[\![a\ Chevy\ truck]\!] = \{X: X \cap [\![Chevy\ truck]\!] \neq \varnothing\}$

The second of these sets is a subset of the first; union of the two sets will simply return the first set itself. This can be characterized as a failure to differ

4. Here, of course, we run into the problems raised by the coarse-grainedness of the possible worlds approach. Sentences have propositions as their semantic value, but in this framework all logically equivalent propositions are identical, as they denote the same set of possible worlds. There are undoubtedly cases in which two sentential expressions which denote the same set of possible worlds appear intuitively to differ in informativity. I will not attempt here to address this well-known problem.

in informativity, if the informativity of a phrase is identified with the contribution it makes to the informativity of the sentence in which it occurs. The contribution of *a truck or a Chevy truck* is identical to the potential contribution of the DP *a truck.* Hence, the DP disjunction does not differ in informativity from its first disjunct.

1.3 The constraints interacting

So far, we have seen the Relevant Informativity Constraint and the Non-Vacuity Constraint operating independently to rule out certain disjunctive assertions in the context of a particular question. Some more complex cases suggest that the two constraints interact in an interesting way. Consider the following:

(24) Q: What kind of vehicle does Jane have?
A: ?Either she has a big truck, or she has a truck and George owns a station wagon.

Once again, the disjunctive response is infelicitous. However, it does not suffer from the ills of either of the previous two cases. Like the response in (18), this response provides a (partial) answer to the question asked. (24)A entails that Jane has a truck, and so update with its content will eliminate any worlds in which this is not the case. Moreover, unlike the response in (18), it is not the case that one disjunct entails another. Consequently, the semantic value of the disjunction differs from the semantic value of either disjunct. I was careful, though, to say that differing in semantic value is a necessary but not sufficient condition for two expressions to differ in informativity. I would like to argue that in the context of the question asked, the disjunction in (24)A is not differently informative from the second disjunct alone. This is because the disjunction as a whole gives the same answer to this question as the second disjunct alone, i.e.:

(25) W/Q^{c+J} owns a big truck or she owns a t. and G owns a s.w. =
W/Q^{c+J} owns a t. and G owns a s.w.

First of all, let me demonstrate that this is the case. The easiest way to see it is from the diagrams in Figures 5 and 6. Look first at Figure 5.

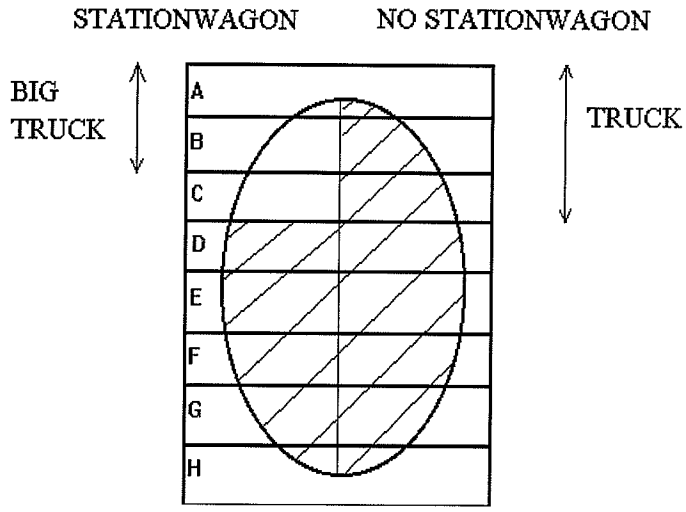

Figure 5
c + *J. owns a truck and G. owns a stationwagon* = c'
$W/Q^{c'} = \{A,B,C\}$

As usual, the large rectangle with its divisions represents the partition imposed on W by the question. The three cells A, B and C contain worlds in which Jane owns a truck. The cells A and B contain worlds in which Jane owns a big truck. The oval represents the starting information state of the questioner. As the question of whether George owns a stationwagon is unresolved in this context, and is unrelated to the question of what kind of vehicle Jane owns, I assume that in half of the worlds in the context (the left hand side of the picture) George owns a stationwagon, and in the other half (the right hand side of the picture) he doesn't. The diagram shows the effect of updating this information state with the content of the second disjunct, *Jane owns a truck and George owns a stationwagon.* The shaded area represents the worlds incompatible with this proposition, which will be eliminated. The unshaded area represents the updated context. Notice that this new information state is compatible with three cells of the partition, A, B and C: those cells containing worlds in which Jane owns a truck.

Now look at Figure 6:

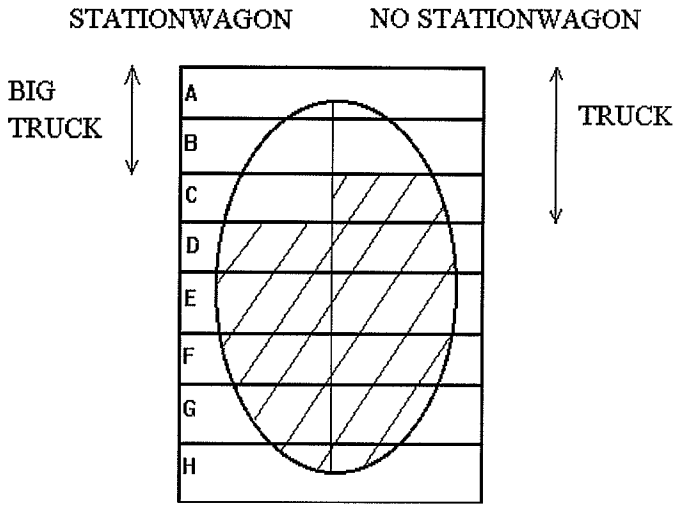

Figure 6
c + *J. owns a big truck or she owns a truck and G. owns a stationwagon* = c"
$W/Q^{c''} = \{A,B,C\}$

This diagram represents the effect of updating the context with the disjunction as a whole. Notice first that the resulting information state is different from that in Figure 5: the disjunction as a whole expresses a different proposition than the second disjunct alone. But now notice that nonetheless, the resulting information state is compatible with the same three cells of the partition: A, B and C. In other words, the disjunction gives the same answer to the question asked as would its second disjunct alone. The violation involved is thus a complex one. It is not the case that any operation needed to interpret the disjunction is straightforwardly vacuous. However, the disjunction is vacuous given the intended goal of the assertion: to be relevantly informative with respect to the question asked. With respect to informativity *simpliciter*, the disjunction does not violate Non-Vacuity; it is differently informative than either of its disjuncts. But with respect to Relevant Informativity, the disjunction *does* violate Non-Vacuity: it has the same degree of Relevant Informativity as its second disjunct alone.

Unlike the previous cases, the disjunction in (24)A is not straightforwardly unacceptable. All we have to do to make it felicitous is to provide a question to which each disjunct constitutes a possible and distinct

answer. Suppose, then, that Jane and George are housemates, and that they are moving house together. I am wondering about the mechanics of their move:

(26) Q: How are they going to move all their stuff?
A: Well, either Jane has a big truck, or she has a truck and George has a stationwagon. Either way, they can get everything into their own cars.

In response to this question, the disjunction is perfectly acceptable and indeed, in this context, it does not violate either of the constraints proposed. The disjunction is Relevantly Informative: it eliminates (many) possible answers to the question asked, such as that Jane and George are going to rent a moving van. It also satisfies the Non-Vacuity Constraint, for each disjunct offers a *distinct* possible answer to the question[5]. It is not the case that assertion of either disjunct alone would provide the same answer as is offered by the disjunction as a whole. In this case, the disjunction constitutes a felicitous response. This accounts for the differing judgements about the disjunction *qua* disjunction in the two contexts: in the context of (24), the disjunction itself appears somewhat peculiar. In (26), where it provides a felicitous response, it is perfectly acceptable.

1.3. Summary so far

I have presented a framework for questions and answers in which questions are partitions on the set of possible worlds, and answers are responses which provide information incompatible with at least one cell of the relevant partition. Working within this framework, I have introduced two constraints. The first, the Relevant Informativity Constraint, is currently stated as a constraint on responses to questions. It says that if a response is informative at all, it must be relevantly so. The second, the Non-Vacuity Constraint, is offered as a general constraint on discourse contributions. It says, essentially, that no logical operation should be informationally redundant. I then showed that these two constraints provide an account of the ways in which disjunctive answers are constrained. It turned out that a disjunctive answer can be Relevantly Informative only if each disjunct constitutes a possible answer to the question asked. Disjunctions in which one disjunct entails another violate the Non-Vacuity Constraint. And when a disjunction is given in answer to a question to which each disjunct constitutes the *same* answer (i.e. when each

5. Note that both answers are indirect, in the sense discussed above. *Jane has a big truck* is an answer to the question only if the questioner's information state entails that you can use a big truck to move a lot of stuff, that they would have a way of getting stuff into the truck, and so on.

disjunct intersects with the same set of cells of the question), it is ruled out by an interaction between these two constraints.

In two of the three cases considered, the disjunctions were infelicitous not only *qua* answers, but simply *qua* disjunctions. Disjunctions like (2), repeated here, seem straightforwardly unacceptable.

(2) #Either you have dirt in your fuel line or it is raining in Tel-Aviv.

Disjunctions like (18), in which one disjunct entails another, are similarly infelicitous, as already observed in the literature (Hurford 1974)[6]:

(18) #Either Jane drives a truck or she drives a Chevy truck.

In other words, it seems that disjunctions generally are required to do what Grice describes them as doing: to present a series of alternatives, each relevant in the same way to a given topic, and also (something Grice does not say) each constituting, in some sense, a distinct alternative. In the next section, I will show how the generalizations made with respect to disjunctive answers can be extended to disjunctive assertions generally.

2. Disjunctive Assertions

2.1. Constraints on assertions

It is not only in answering questions that a discourse participant is constrained as to what she may felicitously assert. If we are in the middle of talking about the baseball scores, and I make an assertion about the completeness proof for modal logic, something will have gone wrong. It would be similarly infelicitous for me to interject something about the baseball scores into a discussion of the completeness proof for modal logic. This observation is merely the commonplace observation that contributions to a discourse are constrained by Grice's Maxim of Relation: "Be Relevant."

As Grice himself says, "the formulation [of the Maxim of Relation] conceals a number of problems...: questions about what different kinds and focuses of relevance there may be, how these shift in the course of a talk exchange, how to allow for the fact that subjects of conversation are legitimately changed, and so on" (1975: 46). In the context of a question, though, one reflex of Relation is captured by the Relevant Informativity Constraint formulated above. My Constraint does not purport to be a generally

6. Hurford in fact claims that "the joining of two sentences by *or* is unacceptable if one sentence entails the other; otherwise, the use of *or* is acceptable." As I have already illustrated, this biconditional formulation is too strong.

applicable characterization of Relation; what it does is say what it is for an assertoric response to a question to satisfy the Relation requirement.

However, the Relevant Informativity Constraint does seem to have a somewhat broader application. What I noted at starting is that assertoric contributions to *any* discourse are required to do more than be straightforwardly informative. In both of the cases I described, my contribution (about modal logic, in the first case, or the baseball scores, in the other) might well be informative. But this does not suffice to make the contribution felicitous. So it seems that the same constraint applies to assertions that are not answers to explicitly asked questions: if a contribution to a discourse is informative, it must be relevantly so.

However, Relevant Informativity is currently defined in terms of providing an answer to a question. How can this be extended to a case where no explicit question has been asked? To answer this, I would like to adopt a view that goes back to the work of Carlson (1983) and which is now being developed by a number of researchers interested in constructing formal models of discourse (see Ginzburg (1995, 1997), Groenendijk (1997), Roberts (1996)). These authors, too, begin from the observation that participants in a discourse are not interested in just *any* kind of information. Their interests are limited to particular topics or issues, and these issues, as it were, set the limits for relevant assertions at any given point in the conversation. These authors argue further that a discourse topic or issue can be treated formally as a question. The idea, then, is that part of a discourse structure is the set of *Questions Under Discussion*, and it is these questions that assertoric contributions must address.

Like Grice's original formulation of Relation, this fundamental idea raises all kinds of issues: In what ways can questions be introduced for discussion? How do participants reach consensus on what questions have this status? When does a question cease to be under discussion? For our purposes, though, these questions need not be resolved. The crucial insight is that, if issues or topics can be characterized as questions, and given the same formal treatment as explicit questions, then the insights we have gained as to what counts as a felicitous assertoric response to an explicitly asked question can be extended to assertions made in other circumstances in discourse.

When an assertion is made in response to an explicit question, the Relevant Informativity Constraint requires that it provide at least a partial answer to that question. Where there is no explicit question, but only the set of Questions Under Discussion, we will want to require that an assertion provide at least a partial answer to *some* member of this set. There is now, though, a further complication. Recall that what counts as an answer depends not only on the semantic object corresponding to the question, but also on the information state of the questioner. In my talk about explicit questions, I was assuming (implicitly) that there is a single questioner. It is that questioner's

information state which must be reduced in such a way as to bring the questioner closer to having an answer to her question. But once we talk about Questions Under Discussion in a discourse, we have to take into account the information states of what may be multiple interlocutors.

At this point, then, I will switch from talking about information states to talking about context sets, in the Stalnakerian sense (Stalnaker 1972, 1973, 1974, 1978). An information state represents the information of a single participant; a context set represents that information (the set of propositions) assumed to be shared by the discourse participants, what Stalnaker calls the Common Ground of the participants[7]. The context set is the set of worlds compatible with the propositions in the Common Ground. Following Stalnaker, we will assume that the interest of participants is in increasing their common ground, and it is thus the context set of the discourse, rather than the information set of particular participants, which must be reduced by an assertion.

From the observations above, though, it is clear that participants are not satisfied by *any* reduction of the context set. Rather, they are interested in reductions of the context set that increase shared assumptions about the possible answers to some Question Under Discussion. In other words, a felicitous assertion must be an answer to some Question Under Discussion with respect to the context set of the discourse.

To allow for a more perspicuous presentation, let me introduce at this point a little notation. I introduce the term *Discourse Context* (DC). A Discourse Context is to be an ordered pair, $<c, QUD>$, where c is a context set and QUD, a set of question denotations. At any point in a discourse, the Discourse Context is the pairing of the context set of the discourse at that point with the set of questions under discussion at that point. An assertion accepted by the discourse participants will result in an update of the Discourse Context. Update of a discourse context by an assertion φ results, first, in the update of c to $c \cap \varphi$. This is the part of the update that we will be concerned with. Update of a discourse context with an assertion also *may* result in a change to QUD, minimally, the elimination from the set of any questions which are resolved by φ. As we will not be concerned with changes to QUD, I will not pursue this further.

We can now use this terminology to give the Relevant Informativity Constraint the new and more general formulation below:

(27) *Relevant Informativity*
φ is relevantly informative with respect to a Discourse Context $<c,QUD>$ iff $\exists Q \in QUD$ s.t. $W/Q^{c+\varphi} \subset W/Q^{c}$.

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7. See the works cited for discussion of when a proposition can be said to belong to the Common Ground or, to use Stalnaker's terminology, to be presupposed.

This says that a proposition is relevantly informative just in case the result of updating c with that proposition eliminates some answer to some Question Under Discussion. We now make Relevant Informativity a felicity condition on (certain) assertoric assertions:

(28) *Relevant Informativity Constraint*
If φ is offered as an informative contribution to a discourse with Discourse Context DC, then φ is felicitous only if it is relevantly informative with respect to DC.

If we add to the Discourse Context model the assumption that when an explicit question is asked, it becomes the only question in QUD (at least for some stretch of the discourse immediately following its utterance) then (27)-(28) subsume the earlier definition (15).

Earlier, I showed that in order for a disjunction to provide an answer to a given question Q, each disjunct must constitute a possible answer to Q. Consequently, if a disjunction is to provide an answer to some member of QUD, there must be some single question in QUD to which each disjunct is a possible answer. It will be of no help if each disjunct constitutes a possible answer to a different member of QUD, for then the disjunction as a whole will fail to provide even a partial answer to any question. This observation explains the fact that disjunctions generally are felicitous only if the disjuncts specify possibilities each of which is "relevant in the same way to a given topic".

We can assume further that the Non-Vacuity Constraint is a generally applicable constraint on assertions. So this will rule out in general the assertion of disjunctions in which one disjunct entails another, such as:

(29) #Either Jane owns a truck or she owns a Chevy truck.

2.2 Summary of the information-based account

The thrust of the argument so far has been the following: Hearers expect assertoric utterances to fulfil a particular function, namely, to provide information about topics of interest. Moreover, they expect utterances to fulfil this function in a fairly efficient way. An utterance of a sentence which fails to fulfil these expectations will generally be considered infelicitous. And any sentence which, in the judgement of an informant, could *never* be uttered in accordance with these expectations will be judged an infelicitous sentence.

Unfortunately, the last step of these claims seems hard to defend. The most obvious kind of counterexample is the tautology. A tautology may be something we would rarely have good reason to say, and a particular utterance of a tautology might be judged infelicitous as a contribution to a discourse by

reason of its uninformativity. However, we do not judge tautological sentences like (30)-(31) anomalous.

(30) A cat is a cat.
(31) If it rains, it rains.

The same holds for tautological disjunctions. Not only are these not anomalous; they are prototypical disjunctions:

(32) Either it'll rain or it won't.
(33) Either the car is red or it's not red.

(32)-(33), being tautologies, can never be informative. So, by my current argument, they should be judged infelicitous, just like:

(34) Either there is dirt in the fuel line or it's raining in Tel-Aviv.

This, I claimed, is infelicitous out of the blue because our usual assumptions about what the world is like preclude there from being a question to which the disjunction as a whole could provide a partial answer.

One might attempt a response to this in terms of implicature. The very obviousness of the non-informative nature of sentences like (32)-(33) might indicate that the speaker is doing what Grice calls "flouting" the constraint. This flouting would give rise to an implicature, perhaps (for an utterance of (32)) that the speaker does not know whether it is raining or not, or is uninterested in whether it is. Thus, although the sentence is not itself informative, its utterance might be.

This kind of account is not really satisfying, though. I have argued that (34) is infelicitous "out of the blue" because it violates Relevant Informativity. (32)-(33), "out of the blue," also violate Relevant Informativity, but are clearly felicitous. If the latter are always "rescued" by a conversational implicature, why isn't the former?

We are brought back to the intuition that the tautologies are felicitous because the disjuncts are obviously "relevant in the same way to a given topic", while the disjuncts in (34) are not. But of course, it was the observation that this is required for the felicity of a disjunction that I set out to explain in the first case. Informativity seems not to have done the trick. While it is true that all of the infelicitous disjunctions I have looked at so far indeed fail to be informative, here we have splendid examples of uninformative disjunctions which are perfectly felicitous. So it is time to try a different route.

3 A Different Route

3.1. Evidence for disjunctions

In "Further Notes on Logic and Conversation" (1989), Grice argues that a person who uses a disjunctive sentence often conversationally implicates that she has non-truth-functional grounds for her assertion. That is, she implicates that her grounds for asserting *A or B* are other than having adequate evidence of the truth of either disjunct. The reasoning proceeds as follows. Suppose a speaker asserts *A or B*. By the Maxim of Quality, she must have adequate evidence that *A or B* is true. Suppose her evidence is evidence that *A* is true. If so, by the Maxim of Quantity, she should have said that *A*, as *A* is more informative than *A or B*. (We can assume that in most situations in which *A or B* is relevant information, *A* would be relevant information too. For an exception, see below.) Consequently, the speaker must lack definite evidence that A is true. Identical reasoning applies to lead to the conclusion that the speaker also does not have evidence that B is true. The conclusion: the speaker has evidence from which she can conclude that at least one of A and B is true, but this evidence is not sufficient to determine which of them is true.

There are some cases in which the assertion that *A or B* is appropriate, but the stronger assertion that *A* would, in fact, be inappropriate. Here is Grice's example:

> I can say to my children at some stage in a treasure hunt, *The prize is either in the garden or in the attic. I know that because I know where I put it, but I'm not going to tell you.* Or I could just say (in the same situation) *The prize is either in the garden or in the attic*, and the situation would be sufficient to apprize the children of the fact that my reason for accepting the disjunction is that I know a particular disjunct to be true. (p.45)

If Grice were to tell his children where the prize was, the game would be over; so in this case the stronger assertion would be inappropriate. Hence, as Grice points out, his utterance of the disjunction in this situation does not implicate that he has non-truth-functional grounds for believing it. And for the same reasons, he would not be expected to have non-truth-functional grounds for his assertion.

But this is a special case, where the speaker is required to withhold information in his possession. Whenever this is not the case, a person who had appropriate evidence to support an assertion that *A* would be in violation of the Maxim of Quantity if she asserted the weaker *A or B*. In the normal case, then, the cooperative assertion of a disjunction will require this special kind of evidence: evidence that the disjunction is true, which is not evidence that any particular disjunct is true. This observation forms the basis of the *evidence-*

based account of the felicity conditions, to which I now turn. The claim I will make is that hearers judge a disjunction to be felicitous just in case they judge that the speaker could have the requisite evidence. Following Grice, I will characterize this kind of evidence as a "reasonable (though not necessarily conclusive) argument with A∨B as conclusion which does not contain one of the disjuncts as a step (does not proceed via A or via B)" (p.44).

Let's begin by thinking about a case in which a speaker might have the relevant kind of evidence. Consider the following, quite natural, disjunction:

(35) Either the Steelers won a game today, or the Pirates did.

Here's a reason why I might say such a thing: I notice a general state of celebration in Pittsburgh which is the usual aftermath of one of those teams winning. I don't know which team played today, but I do know that a victory by either team would produce the effects I have seen. The evidence in which the assertion is grounded could be characterized as an argument of the following form:

(36) Premise 1: On a day that the Steelers win a game, Pittsburgh celebrates.
Premise 2: On a day that the Pirates win a game, Pittsburgh celebrates.
Premise 3: Nothing else leads to the same kind of celebration.
Premise 4 (Observation): Pittsburgh is celebrating.
Conclusion: Therefore either the Steelers won a game today, or the Pirates did.

This is a reasonable argument with the disjunction as conclusion which does not proceed via either of the disjuncts. It is my belief in the truth of the premises, along with my recognition that the conclusion follows from the premises, which licenses my utterance of the disjunction.

On the information-based account laid out in the previous sections, the disjunction in (35) is expected to appear felicitous to a hearer to the extent that she can identify a question to which each disjunct constitutes a possible answer. This should render (35) generally felicitous, as it is easy to identify such a question, namely, *Who won a game today?* But it appears that this does not guarantee the felicity of the disjunction. Rather, the disjunction will appear felicitous to a hearer just in case she is able and willing to reconstruct the argument which provides the grounds for asserting the disjunction.

I begin by considering two cases in which the disjunction is likely to be judged infelicitous by a hearer. In all the cases below, assume that speaker and hearer share the observation that Pittsburgh is celebrating, and that the hearer

knows that the speaker does not have evidence for her assertion from newspaper reports, overheard conversations, and the like. Assume further that no explicit question has been asked. First case: Suppose that the hearer mistakenly believes that the Pirates are a Cleveland team and (truly) believes that when a Cleveland team wins, Pittsburgh does not celebrate. In other words, the hearer has beliefs which conflict with my Premise 2. Thus, she will not recognize that there is some reasonable argument -- be it that in (36), or some other -- with the disjunction as conclusion, which does not proceed via one of the disjuncts. From her perspective, there is no way for me (or anyone else) to have appropriate evidence for this disjunctive assertion, evidence that at least one of the disjuncts is true which is not evidence that a particular one is true. My utterance is likely to seem as odd to her as (37) would seem to any hearer out of the blue:

(37) Either the Steelers won a game today, or Manchester United did.

Note again that for both (35) and (37), there is an easily identifiable question to which each disjunct offers a possible answer, but this does not suffice to render the disjunction felicitous.

Now consider a second case of mismatched presuppositions. Suppose that my hearer is more informed than I am, and knows that the Pirates didn't play today. That is, she shares my premises 1-3, as well as my observation (premise 4), but adds to this the further premise:

(38) Premise 5: The Pirates didn't play today.

It would presumably not occur to the hearer to reconstruct the argument in (36), as the argument omits a relevant premise. So again, from her perspective, there is no reasonable argument with the disjunction as conclusion, and she is likely to find my assertion extremely odd, just as odd as if I had said (39) while surrounded by celebrating Pittsburghers:

(39) Either the Steelers won a game today or Pittsburgh is not celebrating.

In both of these cases, unrecognized differences in the presuppositions of speaker and hearer result in a judgement of infelicity. The source of the judgement is that the argument which grounds the speaker's assertion is, in effect, unavailable to the hearer. From the hearer's perspective, there is no reasonable argument with the disjunction as conclusion which does not proceed via one of the disjuncts. In other words, the hearer cannot see any way for the speaker to have the appropriate kind of evidence for her assertion, and hence judges the assertion infelicitous.

Now for a third case: Suppose the hearer knows that the Steelers and the Pirates are both Pittsburgh teams, and also shares my observation that the Pittsburghers are celebrating, but doesn't know that a Pittsburgh victory leads to a Pittsburgh celebration. In other words, she does not share my premises 1-3. Let's assume, though, that she doesn't hold any beliefs inconsistent with these premises. In this case, the hearer is likely to *accept* the disjunction, because she is likely to be able to reconstruct, or infer, the premises of the argument which provides the evidence for my assertion, in something like the following way:

(40) *Mandy has noticed that Pittsburghers are celebrating, and has said that either the Steelers won or the Pirates did. I don't immediately see what evidence she could have for that. She could reach that conclusion if she assumed that whenever the Steelers or the Pirates win, the Pittsburghers celebrate. Well, that's a reasonable assumption which I'm willing to accept. So I'll infer that this is the case, and accept the disjunction.*

As she is able to reconstruct the argument, she judges the disjunction felicitous.

The final case to consider is that in which the hearer shares all of the beliefs that play a role in the argument in (36). In this case, the disjunction would be judged straightforwardly felicitous. What is interesting about this case is that the disjunction could not constitute new information. If the hearer shares all of my premises then, assuming that her context set (or information state) is consistent, her context set must entail the disjunction I have asserted. The felicity of the assertion in this case offers a challenge to the formulation of the Relevant Informativity Constraint of section 2.1.

Many disjunctive assertions are grounded in arguments like (36). (41) is another such example:

(41) Either Jane is in the library or she's in a coffee shop somewhere.

When would it be reasonable for me to say this? I might say it if I know Jane's habits well enough to know that if she's not in her office in the middle of the morning, she's in one of the other two places mentioned. It is this knowledge (or belief) which provides the evidence for my assertion, or, alternatively, constitute the premises in my reasonable argument to the disjunctive conclusion. Again, I think that the disjunction will appear felicitous to a hearer to the extent that she is able to reconstruct at least the form of this argument.

Now, in both of these cases, the disjuncts are easily interpreted as possible answers to a particular question: in the first case, the question *Why is there a general state of celebration in Pittsburgh?* or *Who won a game today?*,

and in the second, *Where is Jane?* But this is because of the nature of the arguments which ground the assertion of each disjunction. In the first case, for example, the argument builds on premises about the relationship between the success of Pittsburgh's teams and the behavior of people in Pittsburgh. That, we could say, is an argument designed to reach an answer to the question *Why is there a general state of celebration in Pittsburgh?* If I had more specific information, I would be able to reach a non-disjunctive conclusion to this question. Similarly, the disjuncts in (41) both provide possible answers to the question *Where is Jane*?, because the argument which leads to this conclusion is designed to reach an answer to this question. But this is an accidental property of the examples considered. What we look for in judging the felicity of the disjunction is the reasoning which underlies and provides evidence for the disjunction, rather than the question that the disjunction could be an answer to.

To further reinforce this claim, I'd like to look again at the infelicitous example:

(42) #Either there's dirt in the fuel line or it's raining in Tel-Aviv.

What I said earlier is that people find the disjunction infelicitous because they cannot come up with any question to which each disjunct would provide an answer. Now, what people do when faced with this disjunction is to try to concoct some scenario in which some one observation could be explained by each disjunct . One response is to imagine that for some reason or other, the car is sensitive to the weather in Tel-Aviv. (Suppose that we are in Jerusalem, and when it rains in Tel-Aviv it's more humid in Jerusalem, which makes the car run badly.) Once we set up some such assumption, the disjunction becomes acceptable. One way to explain this is to say that now both disjuncts constitute possible answers to the question, *What is wrong with the car?*, making the disjunction as a whole informative with respect to that question. But I think it more to the point that our new (and rather odd) assumption puts us in a position to construct an argument along the following lines:

(43)	Premise 1:	Dirt in the fuel line causes malfunction M.
	Premise 2:	Rain in Tel-Aviv causes malfunction M.
	Premise 3:	Nothing else causes malfunction M.
	Observation:	This car has malfunction M.
	Conclusion:	Either there is dirt in the fuel line or it is raining in Tel-Aviv.

What we have, again, is a reasonable argument to the disjunctive conclusion which does not proceed via either disjunct, providing the requisite kind of evidence for the assertion of the disjunction. What makes the disjunction so

peculiar out of the blue is that Premise 2 is so implausible. Hence, it is very implausible that a speaker could have evidence that one or the other disjunct is true, other than evidence that a particular disjunct is true. And as hearers, we expect speakers to assert disjunctions only when they have evidence of the right kind.

Further support for this view is provided by one of the ways in which a speaker might justify her assertion of a disjunction. Suppose that your mechanic did assert (42) in answer to your question, *What is wrong with my car?*

(42) Either there is dirt in the fuel line or it's raining in Tel-Aviv.

You indicate that you find the answer peculiar. Your mechanic responds by explaining the connection between the weather in Tel-Aviv and the behavior of your car, and the similarity between malfunction caused by the weather in Tel-Aviv and malfunction caused by dirt in the fuel line. That is, she justifies her assertion by providing you with the premises from which the argument to the disjunctive conclusion proceeds. Once you know the premises, you can see that the speaker has the appropriate kind of evidence for the felicitous assertion of the disjunction.

Notice that having different evidence for each disjunct of a disjunction -- that is, arguments with disjoint sets of premises -- will never give you the right kind of evidence for felicitously asserting the disjunction. Setting aside the invented causal link between the state of the car and the weather in Tel-Aviv, suppose that you have reason to believe that there might be dirt in the fuel line (the malfunctioning of the car), and reason to believe that it might be raining in Tel-Aviv (the weather forecast you heard in the morning). This doesn't suffice to allow you to assert the disjunction, for your evidence doesn't entail that at least one of these things is true. There is no argument constructable from the available premises to the disjunctive conclusion. On the other hand, if you had reason to believe that there *is* dirt in the fuel line and that it *is* raining in Tel-Aviv, then you still have the wrong kind of evidence for asserting the disjunction. In this case, your premises license the stronger, conjunctive conclusion; any argument from these premises to the disjunction must proceed via one of the disjuncts. This reflects the fact that the evidence you have is too *strong* for you to felicitously assert the disjunction. By Quantity, it is the conjunction that you should have asserted. Similarly, if you have evidence about either disjunct alone, you should have asserted whichever you have evidence for (modulo the relevance requirement). Your evidence, again, is of the wrong kind to license assertion of the disjunction, and this, again, is reflected by the fact that the argument that grounds your assertion must proceed via one of the disjuncts. The kind of evidence required for the felicitous assertion of a disjunction will only be available when there is a single

set of premises that leads to the disjunctive conclusion, and to nothing stronger or weaker.

The idea then is this: to assert a disjunction, you must have the requisite kind of evidence: evidence that the disjunction as whole is true, which is not sufficient evidence that any particular disjunct is true. A hearer will judge a disjunction felicitous just in case she recognizes that you could have this kind of evidence. When you have the right kind of evidence, you are in a position to construct an argument to the disjunctive conclusion in which no disjunct occurs as a step.

It is further the case that when you have the right kind of evidence for a disjunction, there is also often a single question to which each disjunct provides a possible answer. However, we saw above that the availability of such a question does not ensure the felicity of the disjunction. And there are other cases in which we recognize that two disjoined propositions are "related in the same way to a given topic" (Grice (1989: 68)), but can identify only very broad questions to which each disjunct provides a possible answer. In those cases we can, though, identify an argument to the disjunctive conclusion. Here is an example:

(44) Either Jane lost her nerve or she's finished her parachute jump by now.

It's hard to think of a question more specific than *What did Jane do?* or *What happened?* to which each disjunct would provide an answer. However, there is an obvious way in which the disjuncts are related. We infer, as hearers, that the speaker knows someone called Jane who was planning a parachute jump. We infer further that the speaker thinks it possible that Jane would have lost her nerve and not jumped, but that other than losing her nerve, there is no reason why she would not have jumped by now. The speaker doesn't have evidence as to which happened. The disjunction is felicitous to the extent that we, as hearers, can reconstruct the premises which provide the speaker with the appropriate kind of evidence.

3.2. Tautological Disjunctions and other apparent violations

I pointed out above that tautological disjunctions like (45) constitute a problem for the information-based account of the felicity conditions of disjunction:

(45) Either it's raining or it's not.

But given the evidence-based account, tautological disjunctions are expected to be felicitous. A speaker will always have the appropriate evidence for the assertion of a tautological disjunction, unless she happens to have evidence that

warrants the assertion of one of the disjuncts. And of course, it will always be clear to a hearer what that evidence is. That accounts for the fact that the disjunction *qua* disjunction is felicitous. It may well be the case that an utterance of the disjunction in a particular discourse situation will be felicitous only by virtue of the implicatures which it generates, but in this a disjunctive tautology is no different from any other tautological utterance.

There is another type of disjunction whose felicity appears to violate the felicity conditions proposed under the evidence based account. On this account, it is to be expected that assertion of a disjunction one disjunct of which is mutually known by speaker and hearer(s) to be false will be infelicitous. When I know that *B* is false, the only evidence I could have for *A or B* is evidence that *A* is true, which requires me, of course, to assert that *A*. However, disjunctions like (46), though humorous, are felicitous:

(46) Either George is in love or I'm a monkey's uncle.

On the face of it, this is unpredicted by either account. There is no imaginable question to which each disjunct could be an answer; nor can we concoct any set of premises which would entail that at least one of these disjuncts is true, but not that any particular one is true. But "monkey's uncle" disjunctions are clearly a special case. They require, first, that there be only two disjuncts and, second, that one of the disjuncts be clearly false. *I'm a monkey's uncle* is a special idiom which English speakers use precisely for this purpose. "Monkey's uncle" disjunctions invariably have the rhetorical effect of an emphatic assertion of the non-monkey disjunct. This effect is an implicature, generated by a Gricean argument along the following lines:

i. Speaker has asserted *A or B*, so she must have adequate evidence that at least one of *A* and *B* is true.
ii. *B* is obviously false.
iii. So the speaker must have evidence that *A* is true.
iv. However, she asserted something weaker than *A*, in violation of Quantity.
v. But she chose to make the violation blatant and so does not intend to convey the weaker proposition.
vi. She chose a form usually used to list alternative possibilities, and gave only one, clearly false, alternative to *A*.
vii. Hence, she wishes to convey that there are no alternative possibilities to *A*.

Unlike tautological disjunctions, "monkey's uncle" disjunctions involve intentional violation ("flouting") of a Maxim, and so, strictly speaking, are infelicitous. But the speaker of a "monkey's uncle" disjunction invariably

intends to convey a stronger proposition than that asserted, i.e. to convey whatever is expressed by the non-monkey disjunct. These disjunctions are thus invariably associated with a conversational implicature[8].

3.2.1. Entailing disjunctions again

In the information-based account, the infelicity of entailing disjunctions like (47) was derived from the Non-Vacuity Principle, which disallows utterances whose interpretation involves informationally vacuous operations.

(47) #Either Jane owns a truck or she owns a red truck

I now show that even on the evidence-based account, the same principle will be needed.

To assert (47) felicitously, a speaker ought to have evidence that the disjunction is true which is not sufficient evidence for the truth of either disjunct. But a speaker who has evidence that the disjunction is true inevitably has adequate evidence of the truth of the weaker disjunct.

In this case, though, the argument put forward earlier that a speaker who has evidence that *A* should not assert *A or B* is not applicable. This was an argument from the Maxim of Quantity, and held for cases in which *A* is stronger than *A or B*. In the current case, the disjunct which intuitively "should" be asserted is not stronger than the disjunction as a whole. So the Maxim of Quantity does not bear on the issue. Hence, we are forced back to the Maxim of Manner, and in particular to the Non-Vacuity Principle, to account for the infelicity of entailing disjunctions.

However, the Non-Vacuity Principle is something that we need anyway, in some form or another. The same principle, presumably, also accounts for observations unrelated to disjunction. It would account, for

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8. I think this implicature may be what Grice calls a generalized conversational implicature. Note that we derive the implicature even when the sentence is given out of any context. Ordinary conversational implicatures arise only in a particular conversational setting. Moreover, the "monkey's uncle" effect is not produced by just any obviously false disjunct. Even it is perfectly obvious to speaker and hearer that it is currently raining, the disjunction:

(i) Either George is in love or it's not raining right now

would be less successful as an emphatic assertion that George is in love than the "monkey's uncle" disjunction. One can innovate, but an element of hyperbole is required, as in:

(ii) Either George is in love, or I'm a duck-billed platypus.

instance, for the fact that the conjunction of entailing clauses is also generally infelicitous:

(48) Jane owns a red truck and she owns a truck.

On the Boolean perspective, conjunction is treated as set intersection. The intersection of the propositions expressed by the conjuncts is identical to the proposition expressed by the first conjunct, and hence this operation is vacuous. The conjunction of these two clauses is a violation of just the same kind as their disjunction.

A further reason to believe that entailing disjunctions are ruled out by considerations of informativity is that, like "monkey's uncle" disjunctions, they can be saved by conversational implicatures. Suppose you are an unwilling participant in a planned camping trip. I ask you what kind of weather you expect, and you reply gloomily:

(49) Either it'll rain or it'll pour.

Like the "monkey's uncle" disjunctions, this sort of assertion involves an intentional and blatant violation of the felicity conditions, again for the purpose of emphasis. What the speaker conveys is something along the lines of "it will undoubtedly rain", or perhaps, "the only alternative to rain is rain". Similarly, in an appropriate context, even sentence (47) above could be used to convey that Jane undoubtedly has a truck. This is possible because there is no difficulty in determining what kind of evidence supports the assertion. And when it is clear that the speaker intends her utterance to generate an implicature, the disjunction is in fact differently informative from its weaker disjunct.

3.2.3 Complex cases

Within the information-based account, the infelicity of complex examples like (50)-(51) was explained as the interaction of Relevant Informativity and Non-Vacuity.

(50) Either Jane owns a big truck, or she owns a truck and George owns a stationwagon.

(51) Either Jane owns a red truck, or she owns a truck and she's happy.

The Non-Vacuity Constraint has a place in the evidence-based account, but Relevant Informativity has gone. So the question is whether there is a way to account for these example in the evidence-based account.

I would suggest that these examples take us back to the old problem that made examples with completely unrelated disjuncts unacceptable: there seems to be no kind of evidence that the speaker could have from which she could conclude that at least one of these disjuncts is true, without being able to conclude which one it is. Our world knowledge does not equip us with any reasonable argument from a single set of premises to the disjunctive conclusion that either Jane has a red truck or she has a truck and she's happy. Again, it seems that the strategy which informants adopt in order to make sense of (51) is to invent premises which would make such an argument possible. Something like this will work: Suppose the speaker has evidence that Jane has a truck. Suppose further that the speaker thinks that red trucks break down all the time, which would make Jane unhappy; but non-red trucks are reliable, which would make Jane happy. If a hearer could assume all of these as premises, the disjunction would be felicitous.

Let's go back now to (50). As I pointed out above (see section 1.3, p.17), this example is odd out of the blue, but fine once it is provided with something like the following context: We suppose that Jane and George are housemates, and are moving house, and that Q is wondering about the mechanics of their move:

(26) Q: How are they going to move all their stuff?
A: Well, either Jane has a big truck, or she has a truck and George has a stationwagon. Either way, they can get everything into their own cars.

What I said earlier is that this context provides a question to which each disjunct constitutes a possible and distinct answer. But the more basic property of the context is, I think, that it provides a premise (Jane and George can get all of their belongings into their own cars) which, together with additional premises pertaining to the sizes of trucks and stationwagons and so forth, forms a reasonable and easily recognized basis for believing that one or the other of the disjuncts is true.

The evidence based account of these complex cases improves upon the information based account in two ways. First, it is simpler. Second, it saves us from having to make use of the Maxim of Manner in a somewhat problematic way. In the account I offered above (section 1.3), I argued that disjunctions like (51) are ruled out as vacuous, not because one disjunct entails another but because, with respect to the relevant question, the disjunction as a whole gives the same information as one of the disjuncts. Hence, I argued, by the Non-Vacuity constraint, the speaker should have asserted that disjunct, not the disjunction.

The Non-Vacuity constraint is a formulation of one aspect of the restrictions imposed by Grice's Maxim of Manner. In the usual applications

of the Maxim of Manner, the Maxim has the effect of choosing between two possible utterances which would convey the same proposition *p*. This is the case in the application of the Non-Vacuity Constraint to rule out the assertion of entailing disjunctions in favor of the entailed disjunct. But the use of the Non- Vacuity Constraint in the earlier treatment of cases like (51) had the effect of choosing between two possible utterances which convey *distinct* propositions. In other words, in this application, the Maxim of Manner is determining not only how a proposition is conveyed, but also which proposition a speaker should choose to convey[9]. On the evidence based account, the Non-Vacuity Constraint plays no role in the explanation of the felicity conditions of the disjunctions considered in this section. We can thus maintain the condition in its simpler and less powerful form, allowing it to rule out only straightforwardly vacuous operations of union (and intersection).

4 Conclusion

I set out to provide an account of the felicity conditions of unembedded disjunctions, and wound up by giving two accounts. The first account is information-based: The felicity of an utterance is taken to depend upon how useful the information which it contains is to a hearer. The second account is evidence-based: A hearer expects a speaker to have evidence of the appropriate kind, and will find infelicitous any utterances for which, in her judgement, a speaker could not have the appropriate evidence.

As I have pointed out, there is a connection between the two accounts. The notion of "useful information" which I used in giving the information-based account was that of a proposition which provides an answer to a question. Now, when we have evidence for an assertion about some topic, we also have an answer to certain formulatable questions about that topic. The same holds when the assertion for which we have evidence is a disjunction: what we have is a disjunctive answer to a formulatable question about the topic. However, we have seen cases such as (44) above, in which it is hard to think of a question, but easy to find the theory which links the disjuncts. Hence my conclusion that the evidence requirement is more basic.

Tautological disjunctions provided further evidence in favor of the evidence-based account. While the utterance of a particular tautology at a given point in a discourse may well be infelicitous as a contribution, tautological disjunctions are not infelicitous *qua* disjunctions. However, they are clearly not informative. This throws doubt on an account in which informativity is a condition on acceptability.

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9. This observation is due to Zoltán Szabó.

There is a distinction, though, between a failure to convey information at all, and a failure to convey information perspicuously. I have argued that entailing disjunctions are infelicitous because one of their disjuncts makes no contribution to the informativity of the utterance. But there is independent evidence that vacuous operations lead to infelicity, so this observation is not particularly surprising.

The move from an information-based account to an evidence-based account is, I think, of general interest. The requirements imposed on discourse contributions by the Maxims of Relation and Quantity have received quite a lot of attention from linguists and philosophers. Less attention has been paid to the requirements of the Maxim of Quality, or to the interaction of these requirements with others. In my evidence-based account of the felicity conditions of disjunction, we see Quality and Quantity interacting. Quality requires that there be evidence; Quantity requires that the evidence not suffice to license a stronger assertion. If the hearer's world-knowledge tells her that these requirements cannot be jointly met, she finds the utterance infelicitous. It is not sufficient that an utterance provide information, or even that it provide relevant information. A felicitous utterance must provide information in accordance with the evidence in which it is grounded.

Some of the data discussed here further suggest that a felicitous disjunctive assertion need not be informative at all, at least in the straightforward sense of eliminating worlds from the context set. If this is so, it requires a revision of the assumption found in much work in the Stalnakerian tradition of formal pragmatics that update of the context set is a minimal requirement on the felicity of an assertion. There are already suggestions in the literature on update semanticsthat some assertions standardly function as tests of the context set, rather than as update operations. Klein, Moens and Veltman (1992) give just such an analysis of *might*: essentially, in this analysis, assertions of the form *might p* simply require the hearer to check that there is a *p* world in the context set, but do not result in any update. It is suggestive that felicitous assertions of modal possibility, like disjunctions, would normally be grounded in arguments, and not in direct evidence. Further investigation might reveal a pragmatically (and perhaps semantically) relevant distinction between assertions based on different types of evidence.

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ON THE FELICITY CONDITIONS OF DISJUNCTIVE SENTENCES

Mandy Simons

Department of Philosophy

Carnegie Mellon University

0. Introduction

In "Indicative Conditionals", Grice (1989: 68) observes that:

> A standard (if not the standard) employment of "or" is in the specification of possibilities (one of which is supposed by the speaker to be realized, although he does not know which one), each of which is relevant in the same way to a given topic. 'A or B' is characteristically employed to give a partial answer to some [wh]-question, to which each disjunct, if assertible, would give a fuller, more specific, more satisfactory answer.

As illustration, consider sentence (1):

(1) Either you have dirt in your fuel line or your carburetor is gummed.

Your mechanic might say this to you in response to your asking, "What is wrong with my car?". You would understand that each disjunct constitutes what, from your mechanic's perspective, is a possibly true answer to the question. Of course, you wouldn't have to have asked the question explicitly in order to elicit (1). If you had dropped the car off in the morning and called in the afternoon, your mechanic might offer (1) even before you had the chance to ask the question. In that case, the question is nonetheless implicit; the issue of what is wrong with your car is clearly a live one between you and your mechanic.

Not only is it typical for disjunctions to be used to list related possibilities, but it is apparently necessary. A disjunction which cannot be interpreted in this way is generally quite unacceptable, as illustrated by the following:

(2) #Either you have dirt in your fuel line or it is raining in Tel-Aviv.

(2) would certainly be an infelicitous response to your question, "What is wrong with my car?" Moreover, it is hard to think of any situation in which (2) could be felicitously uttered. To make it felicitous, we would need to concoct some connection between the mechanical state of your car and the

weather in Tel-Aviv. Unless we can, (2) remains infelicitous. So disjunctions not only may be used, as Grice says, to list a series of possibilities, "each of which is relevant in the same way to a given topic", but must be so used. The goal of this paper is to explain why this is so.

The paper will, in fact, present two different but related accounts. In sections 1 and 2, I will set out the account which I formulated in my dissertation (Simons 1998). This is what I will call an *information-based* account, its central claim being that it is only when disjunctions are interpretable as listing possible answers to a given question that they can provide information which is useful to a hearer. In section 1, I will focus on the case of disjunctions given in answer to an explicit question, and will address the question of why, in such a case, each disjunct must be interpretable as a possible answer to that question. I will then go on, in section 2, to argue that the generalizations made can, at least to some extent, be extended to non-answer uses of disjunction by adopting a view of discourse in which every assertion is seen as being the answer to some question, either explicit or implicit.

In section 3 of the paper, I will suggest that the failure of informativity associated with many infelicitous disjunctions is really a by-product of a more basic failure, namely, a failure of *evidence*. This will lead to a somewhat different account of the felicity conditions, and one which avoids some of the difficulties faced by the first. The second account is *evidence-based*. The central claim here is that disjunctions are judged infelicitous when, in the judgement of the hearer, it is not possible for the speaker to have the appropriate kind of evidence for the assertion of the disjunction. As I will show, many cases in which a disjunction is supported by appropriate evidence turn out to be cases in which each disjunct is an answer to a given question.

The discussion here will be limited almost entirely to cases of clausal disjunction, although some of the observations apply to phrasal disjunctions also. I will assume throughout that *or* has the truth conditions of inclusive disjunction; this assumption will be fundamental in both of the accounts I present.

1. Disjunctive Answers

My first step, then, is to look at disjunctions given in answer to an explicit question. The claim I will make is quite simple: a disjunction can provide an answer to a question Q only if all of its disjuncts provide possible answers to Q. To make this point precisely, I will adopt Groenendijk and Stokhof's (1984) formalization of the question/answer relation which relies, in turn, on their semantics for questions. I will present the relevant aspects of their theory

in section 1.1. In section 1.2., I will demonstrate the truth of my claim, and will discuss what this has to do with the felicity conditions on disjunctions.

1.1. Groenendijk and Stokhof (1984): The Semantics of Questions and the Pragmatics of Answers.

Groenendijk and Stokhof propose an analysis of questions within a possible worlds framework, following an approach which originates with Hamblin (1973). Hamblin's original insight was that questions denote sets of possible answers, that is, sets of propositions which constitute possible answers to the question. Based on issues relating to the interpretation of embedded questions, Groenendijk and Stokhof (1982) argue that the extension of a question at a possible world is that proposition which constitutes a true and exhaustive answer to the question at that world. The intension of a question, then, is a function from worlds to propositions: for each world, the function gives the proposition which is the true and exhaustive answer at that world.

An alternative but equivalent way to characterize the intension of a question is as a set of propositions, where each member of the set is the true and exhaustive answer to the question at some world. For example, the semantic value of the question *Is it raining in Tel-Aviv?* is the set containing the proposition that it is raining in Tel-Aviv and the proposition that it is not raining in Tel-Aviv. At any possible world, the true and exhaustive answer to this question is given by one of these propositions. In other words, these are the only two possible answers to the question.

In general, a yes/no question will have as denotation a two-membered set of propositions: basically, the "yes" answer and the "no" answer. (The exception to this is where the question is tautological or contradictory, when there will be only one possible answer to it.) The semantic value of a *wh*-question, on the other hand, will generally have many members, as there are generally many possible exhaustive answers to a wh-question.

Groenendijk and Stokhof identify propositions with sets of possible worlds, so instead of thinking of the denotation of a question as a set of propositions, we can think of it as a set of sets of possible worlds. Moreover, because each answer in the denotation is an exhaustive answer, the sets of possible worlds are non-overlapping. To see why this is so, consider two possible answers to the question *Who came?*: George came (and no one else did), George and Jane came (and no one else did). The qualifications in parentheses are needed because the answers we are interested in are exhaustive answers. Now, if it is true that George and Jane and no one else came, then it is not true that George and no one else came. If the first of these propositions is true at some world, then the second is false, and vice versa. The same will be true for any two exhaustive answers to a given question.

The denotation of a question, then, divides up the set of possible worlds into a number of non-overlapping subsets, with each subset representing a possible exhaustive answer to the question. In other words, the denotation of a question is a *partition* on the set of possible worlds. For any question Q, the denotation of Q is represented as W/Q, the partition imposed by Q on W. Figure 1 represents one possible partition for a very small set of possible worlds W = {a,b,c,d,e,f,g}.

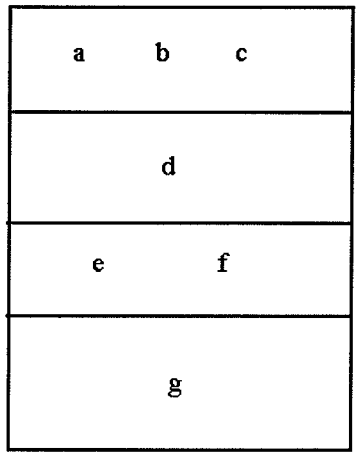

Figure 1

The cells of the partition imposed on W by a question represent what Groenendijk and Stokhof call the *semantic answers* to the question. But they (and we) are interested in a more general notion of answerhood. Clearly, what counts as an answer to a question in an actual discourse context is dependent to a large extent on the state of information of the questioner, what the questioner already takes to be true. Consequently, Groenendijk and Stokhof define a number of notions relating questions as semantic objects to states of information. I set out below those notions which will be useful here. In some cases, I have modified either the notation or the terminology that Groenendijk and Stokhof use, but the treatment is basically theirs.

I follow Groenendijk and Stokhof in assuming a very simple notion of "state of information". I will take a state of information to be a set of propositions or, alternatively, one complex, conjoined proposition. I will assume that this complex proposition is non-contradictory. Given the possible-world perspective adopted here, that means that an information state can be treated as a set of possible worlds, a subset of W. Beyond this, I do not want particularly to try to elaborate on what exactly an information state is.

In this kind of framework, information update is reflected formally by a change in the set of possible worlds which represents the information state. An assertion has the effect of increasing the propositions which the hearer

accepts, thereby eliminating some worlds compatible with those propositions. (If A asserts that p, and her hearers accept that assertion, then worlds in which ~p is true are no longer compatible with the hearers' information states.) The worlds compatible with the new information state are those worlds in the intersection of the previous information state and the proposition asserted, also conceived as a set of possible worlds. Formally, information update is represented as proceeding via set intersection. An assertion p which is accepted by a discourse participant changes that participant's information state from c to $c \cap p$.

A question, we have now said, imposes a partition on the set of possible worlds W, each cell of which constitutes a possibly true answer to that question. The information state of a discourse participant (henceforth, a *participant,* or *speaker*) may itself, though, rule out certain possible answers. Suppose, for instance, that a participant asks, *Who came?*, but already has the information that the only people who might have come are George and Jane, all other possibilities having been eliminated. In this case, there are only three "live" answers to the question: that only George came, that only Jane came, and that only George and Jane came. The set of possible answers to a question Q compatible with an information state c, W/Q^c, is defined as follows:

(3) $W/Q^c = \{X : X \in W/Q \ \& \ X \cap c \neq \varnothing\}$

Thus, given the information state described above, $W/\textit{who came}^c$ will have only three members: the set of worlds in which only George came, the set of worlds in which only Jane came, and the set of worlds in which only George and Jane came. No other members of W/*who came* are compatible with c.

Using this definition, we can define two further notions: the notion of being a *proper question* with respect to an information state, and the notion of a question being resolved in an information state. A question Q is proper in an information state c iff more than one possible answer to Q is compatible with c. This definition is given formally in (4).

(4) Q is a proper question w.r.t c iff $|W/Q^c| > 1$

(4) says that Q is a proper question with respect to c iff W/Q^c (the set of answers compatible with c) has more than one member. This situation is illustrated in Figure 2.

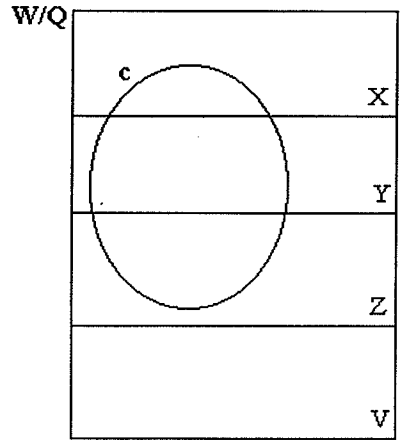

Figure 2
Q is a proper question in c
$W/Q^c = \{X,Y,Z\}$

In this figure, as before, the large rectangle represents the set of worlds W, partitioned as determined by the question Q. Each cell in the partition corresponds to a possible answer to Q. The circle c is the information state of a given discourse participant (a subset of W). Note that c overlaps with three of the cells of W/Q, the cells X, Y and Z. In other words, three possible answers to Q are compatible with the current state of information of the discourse participant. So Q is a proper question in c.

The next notion to define is that of a question being *resolved* by an information state. I will say that a question Q is resolved by c when only one possible answer to Q is compatible with c. Formally:

(5) Q is resolved by c iff $|W/Q^c| = 1$

This situation is illustrated in Figure 3[1].

1. Note that when c is the empty set, then for any Q, W/Q^c is the empty set too. Given my definitions, Q is neither proper nor resolved in such an information state. However, an empty information state does not correspond to any relevant situation, so I set aside any consequences of this possibility.

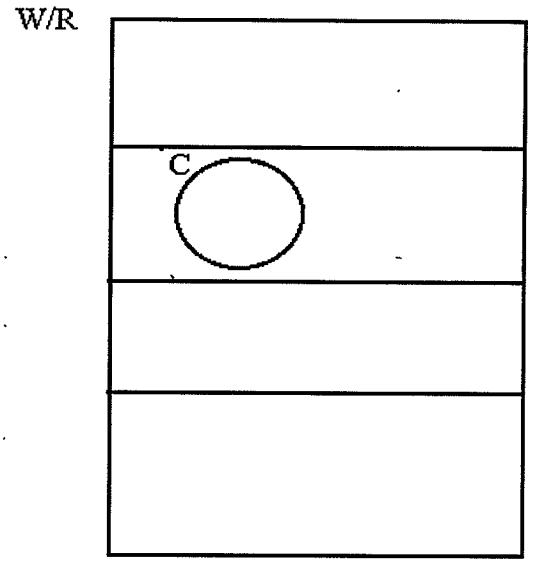

Figure 3
R is resolved by c

With the help of the definitions above, I can now characterize *partial* and *complete* answers to Q. To give a partial answer to a question Q is to give the questioner information which changes her information state in such a way as to eliminate some possible answer to Q. Formally, this corresponds to changing the questioner's information state so that its intersection with some cell of the partition becomes empty. A proposition φ thus partially answers a question Q with respect to an information state c iff fewer possible answers to Q (i.e. fewer cells of W/Q) are compatible with the result of updating c with the content of φ than are compatible with c. To denote the information update operation, I will adopt Heim's (1982) "+" notation. The result of updating c with φ is written "$c+\varphi$". The formal definition of a partial answer is as follows:

(6) A proposition φ partially answers a question Q with respect to c iff $W/Q^{c+\varphi} \subset W/Q^{c}$

To give a complete answer to a question is to eliminate all but one of the possible answers to that question i.e.

(7) A proposition φ completely answers a question Q with respect to c iff Q is proper with respect to c and is resolved by $c+\varphi$.

1.2. Disjunctions as answers

When we answer a question with a disjunction, it will count as an answer only if it succeeds in doing what an answer must do, that is, reducing the hearer's information state in such a way as to eliminate some possible answer to that question. We will now be able to see quite straightforwardly why, in order for a disjunction to do this, each disjunct must constitute a possibly true answer to the question asked.

Suppose Jane asks her mechanic, *What is wrong with my car?*, and her mechanic replies:

(8) Either you have dirt in your fuel line or it's raining in Tel-Aviv.

Let c be Jane's information state at the time she asks the question. The result of updating c with the content of (8) will be to eliminate any worlds in which it is the case neither that there is dirt in the fuel line nor that it is raining in Tel-Aviv. The elimination of such worlds will not, though, get Jane any closer to resolving her question. For it is not the case that all worlds in which there is dirt in the fuel line will be eliminated. Nor is it the case that all worlds in which some other possible fault with the car will be eliminated. In other words, although (8) may convey some information to Jane, it does not convey information which eliminates any possible answer to the question she has asked. This is represented pictorially in Figure 4 (see next page), where the solid oval represents Jane's starting information set c, and the dotted oval represents the information state which she reaches by updating with (8). Figure 4 represents a situation in which Jane's original information state already excluded some possible answers to the question. Updating with sentence (8), although it results in the elimination of *some* worlds from the context, does not exclude any further answers. So (8) fails to be an answer to the question asked.

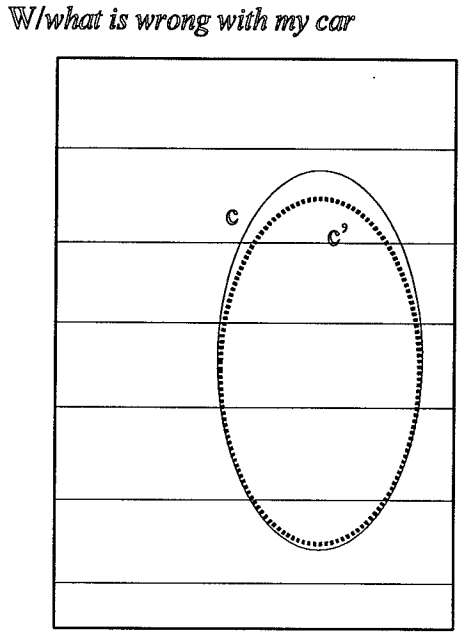

Figure 4

In fact, it is possible for a disjunctive sentence to provide a partial answer to a question only when each disjunct provides a partial answer: only when, as Grice puts it, "each disjunct, if assertible, would give a fuller, more specific, more satisfactory answer [to the question asked]." This can be proved quite straightforwardly. Recall that a proposition φ provides a partial answer to Q iff the set of answers to Q compatible with $c+\varphi$ is a proper subset of the set of answers to Q compatible with c. The following then turns out to hold:

(9) For any information state c and any question Q:

$$W/Q^{c+[A \text{ or } B]} \subset W/Q^{c} \text{ only if}$$
$$W/Q^{c+A} \subset W/Q^{c} \text{ and } W/Q^{c+B} \subset W/Q^{c}$$

i.e. a disjunctive proposition *A or B* can provide a partial answer to Q only if both A and B provide partial answers to Q. The result falls out from the definitions given by virtue of the fact that the result of updating a information state c with a sentence A or B is the intersection of c with the union of (the set of worlds denoted by) A and (the set of worlds denoted by) B. The proof, which requires only simple set theory, is given in (11). The proof uses the lemma in (10):

(10) Lemma:
$W/Q^{c+\varphi} \subset W/Q^c$ iff $\exists X \in W/Q$ s.t. $X \cap c \neq \varnothing$ and $X \cap c \cap \varphi = \varnothing$

(11)

1. Show: for any Q, any c:
$W/Q^{c+[\varphi \text{ or } \psi]} \subset W/Q^c$ only if
$W/Q^{c+\varphi} \subset W/Q^c$ and
$W/Q^{c+\psi} \subset W/Q^c$

2. Suppose that for some arbitrary Q and c,
$W/Q^{c+[\varphi \text{ or } \psi]} \subset W/Q^c$

3. Then $\exists X \in W/Q$ s.t. $X \cap c \neq \varnothing$ and $X \cap c \cap [\varphi \text{ or } \psi] = \varnothing$
(by lemma, L to R)

4. $X \cap c \cap [\varphi \text{ or } \psi] = X \cap c \cap (\varphi \cup \psi)$

5. So $\exists X \in W/Q$ s.t. $X \cap c \neq \varnothing$ and $X \cap c \cap [\varphi \cup \psi] = \varnothing$
(rewrite of line 3)

6. So $\exists X \in W/Q$ s.t. $X \cap c \neq \varnothing$ and $X \cap c \cap \varphi = \varnothing$ and
$\exists X \in W/Q$ s.t. $X \cap c \neq \varnothing$ and $X \cap c \cap \psi = \varnothing$

7. So $W/Q^{c+\varphi} \subset W/Q^c$ and
$W/Q^{c+\psi} \subset W/Q^c$ (by two applications of lemma, R to L)
i.e., φ is a partial answer to Q and ψ is a partial answer to Q.

This result answers the first of our questions: why, when a question is answered with a disjunction, does each disjunct always look like a possible answer to a that question? The answer is that it is only when each disjunct constitutes a possible answer that the disjunction as a whole can do so. In (12), A's response is infelicitous because it fails to give even a partial answer to the question asked.

(12) - Q: What is wrong with my car?
A: Either there is dirt in the fuel line or it's raining in Tel-Aviv.

Certainly, A's response seems infelicitous not only as a response to the question, but as a disjunction. I will argue in the next section that this is because we cannot, offhand, come up with *any* situation in which a question would arise to which both disjuncts would constitute possible answers. However, let me set this aside for now, and concentrate on the infelicity of disjunctions of certain kinds as answers to explicit questions. Below, we'll see a case in which a disjunction appears infelicitous in the context of one

question, but quite acceptable in the context of a different one, which will justify adopting this viewpoint.

Implicit in the discussion above is the assumption that a response to a question is felicitous only if it is an answer to that question. This is clearly inaccurate. There are at least two other ways to respond felicitously to a question. One is to explicitly refuse to answer: to indicate that you are either unable or unwilling to answer the question asked. Another option is to establish or suggest a *strategy* for finding an answer to the question asked. (For discussion of this, see Ginzburg 1995 and Roberts 1996). One way to do this is to ask a related question, as in (13). (See Groenendijk and Stokhof (1984) for a discussion of what it is for two questions to be related.)

(13) Q_1: What's for dinner tonight?
Q_2: Was it tofuburgers last night?

Q_2 is felicitous only if there is known to be a connection between it having been tofuburgers last night and what it will be tonight. If the responder wants to make this connection known, she might choose a response like (14), which indicates that another question -- whether it was tofuburgers last night -- is relevant to the original one, and thereby introduces that question into the discourse:

(14) Q: What's for dinner tonight?
R: If it was tofuburgers last night, it'll be stir-fry tonight.

As Ginzburg (1997) observes, in actual discourse the discussion of a single question may stretch over multiple talk-turns, as participants pursue some strategy of question-resolution. The class of felicitous responses to a given question, then, is not limited to the class of (partial) answers to the question.

However, it is clearly also not the case that any response to a question is felicitous. A response must, in some sense, be relevant. In particular, an assertoric, non-conditional response to a question *does* have to be an answer to count as felicitous, unless it can be interpreted as a refusal. An assertoric response to a question provides the questioner with information, allowing her to update her information state. And if an assertoric response is to be felicitous, it must enable her to update her information state in a particular way: it must provide at least a partial answer to the question asked. In other words, a felicitous response to a question need not be informative; but if it is informative, it must be relevantly so. Let me characterize this as a constraint on responses to questions:

(15) *The Relevant Informativity Constraint*
An assertoric response to a question is felicitous only if it is relevantly informative i.e. only if it provides at least a partial answer to the question asked.

As discussed above, a partial answer is one which eliminates some possible answer to the question[2].

Notice that an assertion can satisfy the Relevant Informativity Constraint without being what we might call a direct answer. Here is an example:

(16) Q: What's for dinner tonight?
A: Well, it was tofuburgers last night.

Suppose that it is generally known that if it was tofuburgers last night, it won't be tofuburgers again tonight. This, then, will be reflected by Q's information state. Any world in this set in which it was tofuburgers last night will be one in which it is not tofuburgers tonight. Updating such an information state with the content of A's assertion thus leaves only worlds in which it is not tofuburgers tonight. The response, then, is informationally equivalent to (17):

(17) A': It's not tofuburgers.

and so constitutes a partial answer to the question. (The preference for A over A' may be that the former also provides justification or evidence for the answer.) Relevant Informativity, then, can be satisfied in somewhat indirect ways.

1.2.1 Further failures of felicity

Let's go back, now, to disjunctive answers to questions. It turns out that failure to satisfy Relevant Informativity is not the only thing that can go wrong with such answers. Something also goes wrong when the disjuncts are too similarly related to the question asked. Consider:

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2. This formulation does not include the caveat that the constraint does not apply to assertoric responses which are interpretable as refusals, like those in (i) and (ii):

(i) Q: Where's Jones?
A: I don't know.

(ii) Q: Where's Jones?
A: She doesn't want to see you.

These assertoric responses are not Relevantly Informative in the sense defined, but they are felicitous (if unhelpful) responses to the question.

(18) Q: What kind of vehicle does Jane drive?
A: Either she drives a truck or she drives a Chevy truck.

Again, the response looks straightforwardly unacceptable, not merely as a response to the question asked, but simply as a disjunction. But once again, I want to concentrate on what is wrong with it as a response.

Unlike the response in (12), this disjunction does provide a partial answer to the question asked. Let c be the starting information state of the questioner. Updating c with the content of the response will result in the elimination from c of any worlds in which Jane drives neither a truck nor a Chevy truck: what will be left are only worlds in which Jane drives a truck, either a Chevy or something else. So clearly the questioner will be a lot closer to an answer than she was before.

What, then, goes wrong? Well, notice that to get Q to the information state she reaches, A could just as well have responded with:

(19) She drives a truck.

The second disjunct of (18)A entails the first. Every world in which Jane drives a Chevy truck is one in which she drives a truck, so the proposition expressed by the second disjunct (i.e. the set of worlds at which this proposition is true) is a subset of the proposition expressed by the first. The result of updating any information state with the disjunction is thus identical to the result of updating with the first disjunct alone. The second disjunct makes no contribution to the informativity of the assertion.

The violation involved here presumably falls somehow under Grice's Maxim of Manner (Grice 1967). That maxim tells us simply: Be perspicuous. Just what is required for perspicuity is hard to say, but it seems reasonable that vacuous operations should be ruled out. Speakers should not require hearers to perform processing operations which do not lead to any informational gain. I will call this requirement the *Non-Vacuity Constraint*:

(20) *Non-Vacuity Constraint*
The output of any logical operation in the interpretation of an utterance must differ in informativity from any input to the operation.[3]

I assume that the interpretation of disjunction involves performing a logical operation equivalent to Boolean join. The Non-Vacuity Constraint thus

3. This imperative is of the same nature as the imperatives in Grice's Maxims, an imperative which every participant in a discourse will assume the other participants to follow. Hence the puzzlement of a hearer faced with an utterance which violates Non-Vacuity.

requires that the output of the join operation on two or more disjuncts differ in informativity from any of the disjuncts.

Let me clarify what I mean by "differ in informativity." For reasons that will become apparent in the next section, I do not want to restrict differing in informativity to differing in semantic value. However, I take it that differing in semantic value is a necessary condition for differing in informativity. Minimally, two sentential expressions must differ in semantic value in order to differ in informativity. On the possible world view adopted here, that means that two sentential expressions must denote two different sets of possible worlds in order to differ in informativity[4]. We can now see clearly why the "entailing disjunction" I discussed above violates the Non-Vacuity Constraint: Here is the example again:

(21) #Either Jane drives a truck or she drives a Chevy truck.

The set of worlds in which Jane drives a Chevy truck is a subset of the set of worlds in which Jane drives a truck. The union of these two sets is thus identical to the first argument. Hence, the semantic value of the output is identical to the semantic value of one of the arguments of the operation. This means that the disjunction has the same degree of informativity as one of its disjuncts.

The definition of Non-Vacuity is also intended to extend to phrasal disjunctions like (22):

(22) #Jane drives either a truck or a Chevy truck.

Once again, it suffices to observe that the semantic value of the disjunction is identical to the semantic value of one of the disjuncts. Assuming a Generalized Quantifier treatment of the DPs, the denotations of *a truck* and *a Chevy truck* will be as in (23):

(23) $[\![a\ truck]\!] = \{X: X \cap [\![truck]\!] \neq \emptyset\}$
$[\![a\ Chevy\ truck]\!] = \{X: X \cap [\![Chevy\ truck]\!] \neq \emptyset\}$

The second of these sets is a subset of the first; union of the two sets will simply return the first set itself. This can be characterized as a failure to differ

4. Here, of course, we run into the problems raised by the coarse-grainedness of the possible worlds approach. Sentences have propositions as their semantic value, but in this framework all logically equivalent propositions are identical, as they denote the same set of possible worlds. There are undoubtedly cases in which two sentential expressions which denote the same set of possible worlds appear intuitively to differ in informativity. I will not attempt here to address this well-known problem.

in informativity, if the informativity of a phrase is identified with the contribution it makes to the informativity of the sentence in which it occurs. The contribution of *a truck or a Chevy truck* is identical to the potential contribution of the DP *a truck.* Hence, the DP disjunction does not differ in informativity from its first disjunct.

1.3 The constraints interacting

So far, we have seen the Relevant Informativity Constraint and the Non-Vacuity Constraint operating independently to rule out certain disjunctive assertions in the context of a particular question. Some more complex cases suggest that the two constraints interact in an interesting way. Consider the following:

(24) Q: What kind of vehicle does Jane have?
A: ?Either she has a big truck, or she has a truck and George owns a station wagon.

Once again, the disjunctive response is infelicitous. However, it does not suffer from the ills of either of the previous two cases. Like the response in (18), this response provides a (partial) answer to the question asked. (24)A entails that Jane has a truck, and so update with its content will eliminate any worlds in which this is not the case. Moreover, unlike the response in (18), it is not the case that one disjunct entails another. Consequently, the semantic value of the disjunction differs from the semantic value of either disjunct. I was careful, though, to say that differing in semantic value is a necessary but not sufficient condition for two expressions to differ in informativity. I would like to argue that in the context of the question asked, the disjunction in (24)A is not differently informative from the second disjunct alone. This is because the disjunction as a whole gives the same answer to this question as the second disjunct alone, i.e.:

(25) $W/Q^{c+J \text{ owns a big truck or she owns a t. and G owns a s.w.}} =$
$W/Q^{c+J \text{ owns a t. and G owns a s.w.}}$

First of all, let me demonstrate that this is the case. The easiest way to see it is from the diagrams in Figures 5 and 6. Look first at Figure 5.

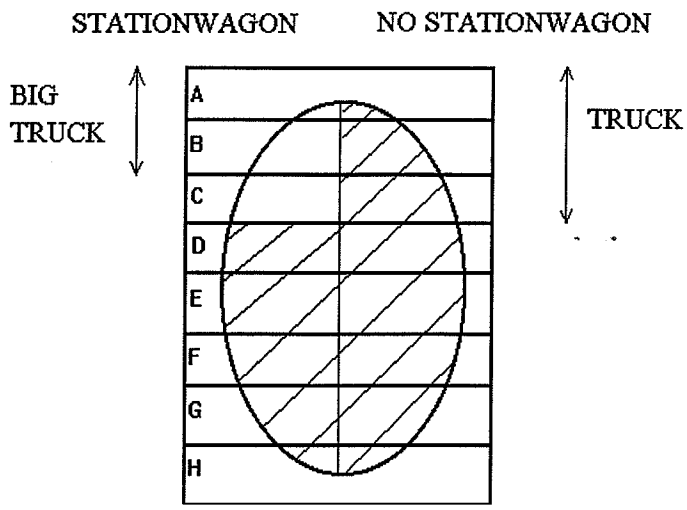

Figure 5
c + *J. owns a truck and G. owns a stationwagon* = c'
$W/Q^{c'} = \{A,B,C\}$

As usual, the large rectangle with its divisions represents the partition imposed on W by the question. The three cells A, B and C contain worlds in which Jane owns a truck. The cells A and B contain worlds in which Jane owns a big truck. The oval represents the starting information state of the questioner. As the question of whether George owns a stationwagon is unresolved in this context, and is unrelated to the question of what kind of vehicle Jane owns, I assume that in half of the worlds in the context (the left hand side of the picture) George owns a stationwagon, and in the other half (the right hand side of the picture) he doesn't. The diagram shows the effect of updating this information state with the content of the second disjunct, *Jane owns a truck and George owns a stationwagon.* The shaded area represents the worlds incompatible with this proposition, which will be eliminated. The unshaded area represents the updated context. Notice that this new information state is compatible with three cells of the partition, A, B and C: those cells containing worlds in which Jane owns a truck.

Now look at Figure 6:

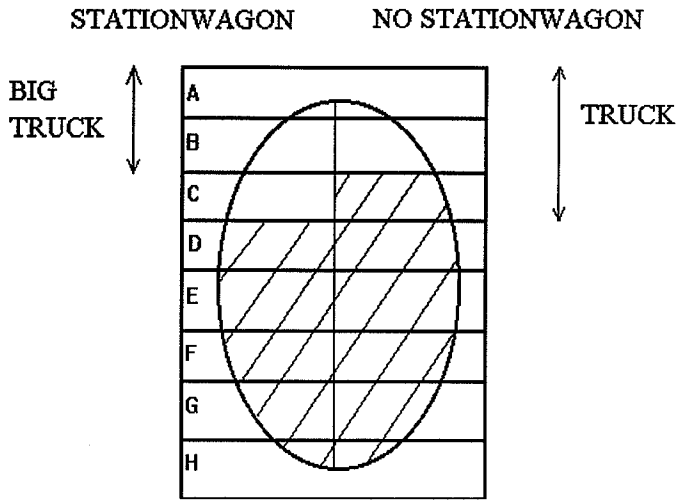

Figure 6
c + *J. owns a big truck or she owns a truck and G. owns a stationwagon* = c"
$W/Q^{c''} = \{A,B,C\}$

This diagram represents the effect of updating the context with the disjunction as a whole. Notice first that the resulting information state is different from that in Figure 5: the disjunction as a whole expresses a different proposition than the second disjunct alone. But now notice that nonetheless, the resulting information state is compatible with the same three cells of the partition: A, B and C. In other words, the disjunction gives the same answer to the question asked as would its second disjunct alone. The violation involved is thus a complex one. It is not the case that any operation needed to interpret the disjunction is straightforwardly vacuous. However, the disjunction is vacuous given the intended goal of the assertion: to be relevantly informative with respect to the question asked. With respect to informativity *simpliciter*, the disjunction does not violate Non-Vacuity; it is differently informative than either of its disjuncts. But with respect to Relevant Informativity, the disjunction *does* violate Non-Vacuity: it has the same degree of Relevant Informativity as its second disjunct alone.

Unlike the previous cases, the disjunction in (24)A is not straightforwardly unacceptable. All we have to do to make it felicitous is to provide a question to which each disjunct constitutes a possible and distinct

answer. Suppose, then, that Jane and George are housemates, and that they are moving house together. I am wondering about the mechanics of their move:

(26) Q: How are they going to move all their stuff?
A: Well, either Jane has a big truck, or she has a truck and George has a stationwagon. Either way, they can get everything into their own cars.

In response to this question, the disjunction is perfectly acceptable and indeed, in this context, it does not violate either of the constraints proposed. The disjunction is Relevantly Informative: it eliminates (many) possible answers to the question asked, such as that Jane and George are going to rent a moving van. It also satisfies the Non-Vacuity Constraint, for each disjunct offers a *distinct* possible answer to the question[5]. It is not the case that assertion of either disjunct alone would provide the same answer as is offered by the disjunction as a whole. In this case, the disjunction constitutes a felicitous response. This accounts for the differing judgements about the disjunction *qua* disjunction in the two contexts: in the context of (24), the disjunction itself appears somewhat peculiar. In (26), where it provides a felicitous response, it is perfectly acceptable.

1.3. Summary so far

I have presented a framework for questions and answers in which questions are partitions on the set of possible worlds, and answers are responses which provide information incompatible with at least one cell of the relevant partition. Working within this framework, I have introduced two constraints. The first, the Relevant Informativity Constraint, is currently stated as a constraint on responses to questions. It says that if a response is informative at all, it must be relevantly so. The second, the Non-Vacuity Constraint, is offered as a general constraint on discourse contributions. It says, essentially, that no logical operation should be informationally redundant. I then showed that these two constraints provide an account of the ways in which disjunctive answers are constrained. It turned out that a disjunctive answer can be Relevantly Informative only if each disjunct constitutes a possible answer to the question asked. Disjunctions in which one disjunct entails another violate the Non-Vacuity Constraint. And when a disjunction is given in answer to a question to which each disjunct constitutes the *same* answer (i.e. when each

5. Note that both answers are indirect, in the sense discussed above. *Jane has a big truck* is an answer to the question only if the questioner's information state entails that you can use a big truck to move a lot of stuff, that they would have a way of getting stuff into the truck, and so on.

disjunct intersects with the same set of cells of the question), it is ruled out by an interaction between these two constraints.

In two of the three cases considered, the disjunctions were infelicitous not only *qua* answers, but simply *qua* disjunctions. Disjunctions like (2), repeated here, seem straightforwardly unacceptable.

(2) #Either you have dirt in your fuel line or it is raining in Tel-Aviv.

Disjunctions like (18), in which one disjunct entails another, are similarly infelicitous, as already observed in the literature (Hurford 1974)[6]:

(18) #Either Jane drives a truck or she drives a Chevy truck.

In other words, it seems that disjunctions generally are required to do what Grice describes them as doing: to present a series of alternatives, each relevant in the same way to a given topic, and also (something Grice does not say) each constituting, in some sense, a distinct alternative. In the next section, I will show how the generalizations made with respect to disjunctive answers can be extended to disjunctive assertions generally.

2. Disjunctive Assertions

2.1. Constraints on assertions

It is not only in answering questions that a discourse participant is constrained as to what she may felicitously assert. If we are in the middle of talking about the baseball scores, and I make an assertion about the completeness proof for modal logic, something will have gone wrong. It would be similarly infelicitous for me to interject something about the baseball scores into a discussion of the completeness proof for modal logic. This observation is merely the commonplace observation that contributions to a discourse are constrained by Grice's Maxim of Relation: "Be Relevant."

As Grice himself says, "the formulation [of the Maxim of Relation] conceals a number of problems...: questions about what different kinds and focuses of relevance there may be, how these shift in the course of a talk exchange, how to allow for the fact that subjects of conversation are legitimately changed, and so on" (1975: 46). In the context of a question, though, one reflex of Relation is captured by the Relevant Informativity Constraint formulated above. My Constraint does not purport to be a generally

6. Hurford in fact claims that "the joining of two sentences by *or* is unacceptable if one sentence entails the other; otherwise, the use of *or* is acceptable." As I have already illustrated, this biconditional formulation is too strong.

applicable characterization of Relation; what it does is say what it is for an assertoric response to a question to satisfy the Relation requirement.

However, the Relevant Informativity Constraint does seem to have a somewhat broader application. What I noted at starting is that assertoric contributions to *any* discourse are required to do more than be straightforwardly informative. In both of the cases I described, my contribution (about modal logic, in the first case, or the baseball scores, in the other) might well be informative. But this does not suffice to make the contribution felicitous. So it seems that the same constraint applies to assertions that are not answers to explicitly asked questions: if a contribution to a discourse is informative, it must be relevantly so.

However, Relevant Informativity is currently defined in terms of providing an answer to a question. How can this be extended to a case where no explicit question has been asked? To answer this, I would like to adopt a view that goes back to the work of Carlson (1983) and which is now being developed by a number of researchers interested in constructing formal models of discourse (see Ginzburg (1995, 1997), Groenendijk (1997), Roberts (1996)). These authors, too, begin from the observation that participants in a discourse are not interested in just *any* kind of information. Their interests are limited to particular topics or issues, and these issues, as it were, set the limits for relevant assertions at any given point in the conversation. These authors argue further that a discourse topic or issue can be treated formally as a question. The idea, then, is that part of a discourse structure is the set of *Questions Under Discussion*, and it is these questions that assertoric contributions must address.

Like Grice's original formulation of Relation, this fundamental idea raises all kinds of issues: In what ways can questions be introduced for discussion? How do participants reach consensus on what questions have this status? When does a question cease to be under discussion? For our purposes, though, these questions need not be resolved. The crucial insight is that, if issues or topics can be characterized as questions, and given the same formal treatment as explicit questions, then the insights we have gained as to what counts as a felicitous assertoric response to an explicitly asked question can be extended to assertions made in other circumstances in discourse.

When an assertion is made in response to an explicit question, the Relevant Informativity Constraint requires that it provide at least a partial answer to that question. Where there is no explicit question, but only the set of Questions Under Discussion, we will want to require that an assertion provide at least a partial answer to *some* member of this set. There is now, though, a further complication. Recall that what counts as an answer depends not only on the semantic object corresponding to the question, but also on the information state of the questioner. In my talk about explicit questions, I was assuming (implicitly) that there is a single questioner. It is that questioner's

information state which must be reduced in such a way as to bring the questioner closer to having an answer to her question. But once we talk about Questions Under Discussion in a discourse, we have to take into account the information states of what may be multiple interlocutors.

At this point, then, I will switch from talking about information states to talking about context sets, in the Stalnakerian sense (Stalnaker 1972, 1973, 1974, 1978). An information state represents the information of a single participant; a context set represents that information (the set of propositions) assumed to be shared by the discourse participants, what Stalnaker calls the Common Ground of the participants[7]. The context set is the set of worlds compatible with the propositions in the Common Ground. Following Stalnaker, we will assume that the interest of participants is in increasing their common ground, and it is thus the context set of the discourse, rather than the information set of particular participants, which must be reduced by an assertion.

From the observations above, though, it is clear that participants are not satisfied by *any* reduction of the context set. Rather, they are interested in reductions of the context set that increase shared assumptions about the possible answers to some Question Under Discussion. In other words, a felicitous assertion must be an answer to some Question Under Discussion with respect to the context set of the discourse.

To allow for a more perspicuous presentation, let me introduce at this point a little notation. I introduce the term *Discourse Context* (DC). A Discourse Context is to be an ordered pair, <c, QUD>, where c is a context set and QUD, a set of question denotations. At any point in a discourse, the Discourse Context is the pairing of the context set of the discourse at that point with the set of questions under discussion at that point. An assertion accepted by the discourse participants will result in an update of the Discourse Context. Update of a discourse context by an assertion φ results, first, in the update of c to $c \cap \varphi$. This is the part of the update that we will be concerned with. Update of a discourse context with an assertion also *may* result in a change to QUD, minimally, the elimination from the set of any questions which are resolved by φ. As we will not be concerned with changes to QUD, I will not pursue this further.

We can now use this terminology to give the Relevant Informativity Constraint the new and more general formulation below:

(27) *Relevant Informativity*
φ is relevantly informative with respect to a Discourse Context <c,QUD> iff $\exists Q \in QUD$ s.t. $W/Q^{c+\varphi} \subset W/Q^{c}$.

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7. See the works cited for discussion of when a proposition can be said to belong to the Common Ground or, to use Stalnaker's terminology, to be presupposed.

This says that a proposition is relevantly informative just in case the result of updating c with that proposition eliminates some answer to some Question Under Discussion. We now make Relevant Informativity a felicity condition on (certain) assertoric assertions:

(28) *Relevant Informativity Constraint*
If φ is offered as an informative contribution to a discourse with Discourse Context DC, then φ is felicitous only if it is relevantly informative with respect to DC.

If we add to the Discourse Context model the assumption that when an explicit question is asked, it becomes the only question in QUD (at least for some stretch of the discourse immediately following its utterance) then (27)-(28) subsume the earlier definition (15).

Earlier, I showed that in order for a disjunction to provide an answer to a given question Q, each disjunct must constitute a possible answer to Q. Consequently, if a disjunction is to provide an answer to some member of QUD, there must be some single question in QUD to which each disjunct is a possible answer. It will be of no help if each disjunct constitutes a possible answer to a different member of QUD, for then the disjunction as a whole will fail to provide even a partial answer to any question. This observation explains the fact that disjunctions generally are felicitous only if the disjuncts specify possibilities each of which is "relevant in the same way to a given topic".

We can assume further that the Non-Vacuity Constraint is a generally applicable constraint on assertions. So this will rule out in general the assertion of disjunctions in which one disjunct entails another, such as:

(29) #Either Jane owns a truck or she owns a Chevy truck.

2.2 Summary of the information-based account

The thrust of the argument so far has been the following: Hearers expect assertoric utterances to fulfil a particular function, namely, to provide information about topics of interest. Moreover, they expect utterances to fulfil this function in a fairly efficient way. An utterance of a sentence which fails to fulfil these expectations will generally be considered infelicitous. And any sentence which, in the judgement of an informant, could *never* be uttered in accordance with these expectations will be judged an infelicitous sentence.

Unfortunately, the last step of these claims seems hard to defend. The most obvious kind of counterexample is the tautology. A tautology may be something we would rarely have good reason to say, and a particular utterance of a tautology might be judged infelicitous as a contribution to a discourse by

reason of its uninformativity. However, we do not judge tautological sentences like (30)-(31) anomalous.

(30) A cat is a cat.
(31) If it rains, it rains.

The same holds for tautological disjunctions. Not only are these not anomalous; they are prototypical disjunctions:

(32) Either it'll rain or it won't.
(33) Either the car is red or it's not red.

(32)-(33), being tautologies, can never be informative. So, by my current argument, they should be judged infelicitous, just like:

(34) Either there is dirt in the fuel line or it's raining in Tel-Aviv.

This, I claimed, is infelicitous out of the blue because our usual assumptions about what the world is like preclude there from being a question to which the disjunction as a whole could provide a partial answer.

One might attempt a response to this in terms of implicature. The very obviousness of the non-informative nature of sentences like (32)-(33) might indicate that the speaker is doing what Grice calls "flouting" the constraint. This flouting would give rise to an implicature, perhaps (for an utterance of (32)) that the speaker does not know whether it is raining or not, or is uninterested in whether it is. Thus, although the sentence is not itself informative, its utterance might be.

This kind of account is not really satisfying, though. I have argued that (34) is infelicitous "out of the blue" because it violates Relevant Informativity. (32)-(33), "out of the blue," also violate Relevant Informativity, but are clearly felicitous. If the latter are always "rescued" by a conversational implicature, why isn't the former?

We are brought back to the intuition that the tautologies are felicitous because the disjuncts are obviously "relevant in the same way to a given topic", while the disjuncts in (34) are not. But of course, it was the observation that this is required for the felicity of a disjunction that I set out to explain in the first case. Informativity seems not to have done the trick. While it is true that all of the infelicitous disjunctions I have looked at so far indeed fail to be informative, here we have splendid examples of uninformative disjunctions which are perfectly felicitous. So it is time to try a different route.

3 A Different Route

3.1. Evidence for disjunctions

In "Further Notes on Logic and Conversation" (1989), Grice argues that a person who uses a disjunctive sentence often conversationally implicates that she has non-truth-functional grounds for her assertion. That is, she implicates that her grounds for asserting *A or B* are other than having adequate evidence of the truth of either disjunct. The reasoning proceeds as follows. Suppose a speaker asserts *A or B*. By the Maxim of Quality, she must have adequate evidence that *A or B* is true. Suppose her evidence is evidence that *A* is true. If so, by the Maxim of Quantity, she should have said that *A*, as *A* is more informative than *A or B*. (We can assume that in most situations in which *A or B* is relevant information, *A* would be relevant information too. For an exception, see below.) Consequently, the speaker must lack definite evidence that A is true. Identical reasoning applies to lead to the conclusion that the speaker also does not have evidence that B is true. The conclusion: the speaker has evidence from which she can conclude that at least one of A and B is true, but this evidence is not sufficient to determine which of them is true.

There are some cases in which the assertion that *A or B* is appropriate, but the stronger assertion that *A* would, in fact, be inappropriate. Here is Grice's example:

> I can say to my children at some stage in a treasure hunt, *The prize is either in the garden or in the attic. I know that because I know where I put it, but I'm not going to tell you.* Or I could just say (in the same situation) *The prize is either in the garden or in the attic*, and the situation would be sufficient to apprize the children of the fact that my reason for accepting the disjunction is that I know a particular disjunct to be true. (p.45)

If Grice were to tell his children where the prize was, the game would be over; so in this case the stronger assertion would be inappropriate. Hence, as Grice points out, his utterance of the disjunction in this situation does not implicate that he has non-truth-functional grounds for believing it. And for the same reasons, he would not be expected to have non-truth-functional grounds for his assertion.

But this is a special case, where the speaker is required to withhold information in his possession. Whenever this is not the case, a person who had appropriate evidence to support an assertion that *A* would be in violation of the Maxim of Quantity if she asserted the weaker *A or B*. In the normal case, then, the cooperative assertion of a disjunction will require this special kind of evidence: evidence that the disjunction is true, which is not evidence that any particular disjunct is true. This observation forms the basis of the *evidence-*

based account of the felicity conditions, to which I now turn. The claim I will make is that hearers judge a disjunction to be felicitous just in case they judge that the speaker could have the requisite evidence. Following Grice, I will characterize this kind of evidence as a "reasonable (though not necessarily conclusive) argument with A∨B as conclusion which does not contain one of the disjuncts as a step (does not proceed via A or via B)" (p.44).

Let's begin by thinking about a case in which a speaker might have the relevant kind of evidence. Consider the following, quite natural, disjunction:

(35) Either the Steelers won a game today, or the Pirates did.

Here's a reason why I might say such a thing: I notice a general state of celebration in Pittsburgh which is the usual aftermath of one of those teams winning. I don't know which team played today, but I do know that a victory by either team would produce the effects I have seen. The evidence in which the assertion is grounded could be characterized as an argument of the following form:

(36) Premise 1: On a day that the Steelers win a game, Pittsburgh celebrates.
Premise 2: On a day that the Pirates win a game, Pittsburgh celebrates.
Premise 3: Nothing else leads to the same kind of celebration.
Premise 4 (Observation): Pittsburgh is celebrating.
Conclusion: Therefore either the Steelers won a game today, or the Pirates did.

This is a reasonable argument with the disjunction as conclusion which does not proceed via either of the disjuncts. It is my belief in the truth of the premises, along with my recognition that the conclusion follows from the premises, which licenses my utterance of the disjunction.

On the information-based account laid out in the previous sections, the disjunction in (35) is expected to appear felicitous to a hearer to the extent that she can identify a question to which each disjunct constitutes a possible answer. This should render (35) generally felicitous, as it is easy to identify such a question, namely, *Who won a game today?* But it appears that this does not guarantee the felicity of the disjunction. Rather, the disjunction will appear felicitous to a hearer just in case she is able and willing to reconstruct the argument which provides the grounds for asserting the disjunction.

I begin by considering two cases in which the disjunction is likely to be judged infelicitous by a hearer. In all the cases below, assume that speaker and hearer share the observation that Pittsburgh is celebrating, and that the hearer

knows that the speaker does not have evidence for her assertion from newspaper reports, overheard conversations, and the like. Assume further that no explicit question has been asked. First case: Suppose that the hearer mistakenly believes that the Pirates are a Cleveland team and (truly) believes that when a Cleveland team wins, Pittsburgh does not celebrate. In other words, the hearer has beliefs which conflict with my Premise 2. Thus, she will not recognize that there is some reasonable argument -- be it that in (36), or some other -- with the disjunction as conclusion, which does not proceed via one of the disjuncts. From her perspective, there is no way for me (or anyone else) to have appropriate evidence for this disjunctive assertion, evidence that at least one of the disjuncts is true which is not evidence that a particular one is true. My utterance is likely to seem as odd to her as (37) would seem to any hearer out of the blue:

(37) Either the Steelers won a game today, or Manchester United did.

Note again that for both (35) and (37), there is an easily identifiable question to which each disjunct offers a possible answer, but this does not suffice to render the disjunction felicitous.

Now consider a second case of mismatched presuppositions. Suppose that my hearer is more informed than I am, and knows that the Pirates didn't play today. That is, she shares my premises 1-3, as well as my observation (premise 4), but adds to this the further premise:

(38) Premise 5: The Pirates didn't play today.

It would presumably not occur to the hearer to reconstruct the argument in (36), as the argument omits a relevant premise. So again, from her perspective, there is no reasonable argument with the disjunction as conclusion, and she is likely to find my assertion extremely odd, just as odd as if I had said (39) while surrounded by celebrating Pittsburghers:

(39) Either the Steelers won a game today or Pittsburgh is not celebrating.

In both of these cases, unrecognized differences in the presuppositions of speaker and hearer result in a judgement of infelicity. The source of the judgement is that the argument which grounds the speaker's assertion is, in effect, unavailable to the hearer. From the hearer's perspective, there is no reasonable argument with the disjunction as conclusion which does not proceed via one of the disjuncts. In other words, the hearer cannot see any way for the speaker to have the appropriate kind of evidence for her assertion, and hence judges the assertion infelicitous.

Now for a third case: Suppose the hearer knows that the Steelers and the Pirates are both Pittsburgh teams, and also shares my observation that the Pittsburghers are celebrating, but doesn't know that a Pittsburgh victory leads to a Pittsburgh celebration. In other words, she does not share my premises 1-3. Let's assume, though, that she doesn't hold any beliefs inconsistent with these premises. In this case, the hearer is likely to *accept* the disjunction, because she is likely to be able to reconstruct, or infer, the premises of the argument which provides the evidence for my assertion, in something like the following way:

(40) *Mandy has noticed that Pittsburghers are celebrating, and has said that either the Steelers won or the Pirates did. I don't immediately see what evidence she could have for that. She could reach that conclusion if she assumed that whenever the Steelers or the Pirates win, the Pittsburghers celebrate. Well, that's a reasonable assumption which I'm willing to accept. So I'll infer that this is the case, and accept the disjunction.*

As she is able to reconstruct the argument, she judges the disjunction felicitous.

The final case to consider is that in which the hearer shares all of the beliefs that play a role in the argument in (36). In this case, the disjunction would be judged straightforwardly felicitous. What is interesting about this case is that the disjunction could not constitute new information. If the hearer shares all of my premises then, assuming that her context set (or information state) is consistent, her context set must entail the disjunction I have asserted. The felicity of the assertion in this case offers a challenge to the formulation of the Relevant Informativity Constraint of section 2.1.

Many disjunctive assertions are grounded in arguments like (36). (41) is another such example:

(41) Either Jane is in the library or she's in a coffee shop somewhere.

When would it be reasonable for me to say this? I might say it if I know Jane's habits well enough to know that if she's not in her office in the middle of the morning, she's in one of the other two places mentioned. It is this knowledge (or belief) which provides the evidence for my assertion, or, alternatively, constitute the premises in my reasonable argument to the disjunctive conclusion. Again, I think that the disjunction will appear felicitous to a hearer to the extent that she is able to reconstruct at least the form of this argument.

Now, in both of these cases, the disjuncts are easily interpreted as possible answers to a particular question: in the first case, the question *Why is there a general state of celebration in Pittsburgh?* or *Who won a game today?*,

and in the second, *Where is Jane?* But this is because of the nature of the arguments which ground the assertion of each disjunction. In the first case, for example, the argument builds on premises about the relationship between the success of Pittsburgh's teams and the behavior of people in Pittsburgh. That, we could say, is an argument designed to reach an answer to the question *Why is there a general state of celebration in Pittsburgh?* If I had more specific information, I would be able to reach a non-disjunctive conclusion to this question. Similarly, the disjuncts in (41) both provide possible answers to the question *Where is Jane*?, because the argument which leads to this conclusion is designed to reach an answer to this question. But this is an accidental property of the examples considered. What we look for in judging the felicity of the disjunction is the reasoning which underlies and provides evidence for the disjunction, rather than the question that the disjunction could be an answer to.

To further reinforce this claim, I'd like to look again at the infelicitous example:

(42) #Either there's dirt in the fuel line or it's raining in Tel-Aviv.

What I said earlier is that people find the disjunction infelicitous because they cannot come up with any question to which each disjunct would provide an answer. Now, what people do when faced with this disjunction is to try to concoct some scenario in which some one observation could be explained by each disjunct . One response is to imagine that for some reason or other, the car is sensitive to the weather in Tel-Aviv. (Suppose that we are in Jerusalem, and when it rains in Tel-Aviv it's more humid in Jerusalem, which makes the car run badly.) Once we set up some such assumption, the disjunction becomes acceptable. One way to explain this is to say that now both disjuncts constitute possible answers to the question, *What is wrong with the car?*, making the disjunction as a whole informative with respect to that question. But I think it more to the point that our new (and rather odd) assumption puts us in a position to construct an argument along the following lines:

(43)

Premise 1:	Dirt in the fuel line causes malfunction M.
Premise 2:	Rain in Tel-Aviv causes malfunction M.
Premise 3:	Nothing else causes malfunction M.
Observation:	This car has malfunction M.
Conclusion:	Either there is dirt in the fuel line or it is raining in Tel-Aviv.

What we have, again, is a reasonable argument to the disjunctive conclusion which does not proceed via either disjunct, providing the requisite kind of evidence for the assertion of the disjunction. What makes the disjunction so

peculiar out of the blue is that Premise 2 is so implausible. Hence, it is very implausible that a speaker could have evidence that one or the other disjunct is true, other than evidence that a particular disjunct is true. And as hearers, we expect speakers to assert disjunctions only when they have evidence of the right kind.

Further support for this view is provided by one of the ways in which a speaker might justify her assertion of a disjunction. Suppose that your mechanic did assert (42) in answer to your question, *What is wrong with my car?*

(42) Either there is dirt in the fuel line or it's raining in Tel-Aviv.

You indicate that you find the answer peculiar. Your mechanic responds by explaining the connection between the weather in Tel-Aviv and the behavior of your car, and the similarity between malfunction caused by the weather in Tel-Aviv and malfunction caused by dirt in the fuel line. That is, she justifies her assertion by providing you with the premises from which the argument to the disjunctive conclusion proceeds. Once you know the premises, you can see that the speaker has the appropriate kind of evidence for the felicitous assertion of the disjunction.

Notice that having different evidence for each disjunct of a disjunction -- that is, arguments with disjoint sets of premises -- will never give you the right kind of evidence for felicitously asserting the disjunction. Setting aside the invented causal link between the state of the car and the weather in Tel-Aviv, suppose that you have reason to believe that there might be dirt in the fuel line (the malfunctioning of the car), and reason to believe that it might be raining in Tel-Aviv (the weather forecast you heard in the morning). This doesn't suffice to allow you to assert the disjunction, for your evidence doesn't entail that at least one of these things is true. There is no argument constructable from the available premises to the disjunctive conclusion. On the other hand, if you had reason to believe that there *is* dirt in the fuel line and that it *is* raining in Tel-Aviv, then you still have the wrong kind of evidence for asserting the disjunction. In this case, your premises license the stronger, conjunctive conclusion; any argument from these premises to the disjunction must proceed via one of the disjuncts. This reflects the fact that the evidence you have is too *strong* for you to felicitously assert the disjunction. By Quantity, it is the conjunction that you should have asserted. Similarly, if you have evidence about either disjunct alone, you should have asserted whichever you have evidence for (modulo the relevance requirement). Your evidence, again, is of the wrong kind to license assertion of the disjunction, and this, again, is reflected by the fact that the argument that grounds your assertion must proceed via one of the disjuncts. The kind of evidence required for the felicitous assertion of a disjunction will only be available when there is a single

set of premises that leads to the disjunctive conclusion, and to nothing stronger or weaker.

The idea then is this: to assert a disjunction, you must have the requisite kind of evidence: evidence that the disjunction as whole is true, which is not sufficient evidence that any particular disjunct is true. A hearer will judge a disjunction felicitous just in case she recognizes that you could have this kind of evidence. When you have the right kind of evidence, you are in a position to construct an argument to the disjunctive conclusion in which no disjunct occurs as a step.

It is further the case that when you have the right kind of evidence for a disjunction, there is also often a single question to which each disjunct provides a possible answer. However, we saw above that the availability of such a question does not ensure the felicity of the disjunction. And there are other cases in which we recognize that two disjoined propositions are "related in the same way to a given topic" (Grice (1989: 68)), but can identify only very broad questions to which each disjunct provides a possible answer. In those cases we can, though, identify an argument to the disjunctive conclusion. Here is an example:

(44) Either Jane lost her nerve or she's finished her parachute jump by now.

It's hard to think of a question more specific than *What did Jane do?* or *What happened?* to which each disjunct would provide an answer. However, there is an obvious way in which the disjuncts are related. We infer, as hearers, that the speaker knows someone called Jane who was planning a parachute jump. We infer further that the speaker thinks it possible that Jane would have lost her nerve and not jumped, but that other than losing her nerve, there is no reason why she would not have jumped by now. The speaker doesn't have evidence as to which happened. The disjunction is felicitous to the extent that we, as hearers, can reconstruct the premises which provide the speaker with the appropriate kind of evidence.

3.2. Tautological Disjunctions and other apparent violations

I pointed out above that tautological disjunctions like (45) constitute a problem for the information-based account of the felicity conditions of disjunction:

(45) Either it's raining or it's not.

But given the evidence-based account, tautological disjunctions are expected to be felicitous. A speaker will always have the appropriate evidence for the assertion of a tautological disjunction, unless she happens to have evidence that

warrants the assertion of one of the disjuncts. And of course, it will always be clear to a hearer what that evidence is. That accounts for the fact that the disjunction *qua* disjunction is felicitous. It may well be the case that an utterance of the disjunction in a particular discourse situation will be felicitous only by virtue of the implicatures which it generates, but in this a disjunctive tautology is no different from any other tautological utterance.

There is another type of disjunction whose felicity appears to violate the felicity conditions proposed under the evidence based account. On this account, it is to be expected that assertion of a disjunction one disjunct of which is mutually known by speaker and hearer(s) to be false will be infelicitous. When I know that *B* is false, the only evidence I could have for *A or B* is evidence that *A* is true, which requires me, of course, to assert that *A*. However, disjunctions like (46), though humorous, are felicitous:

(46) Either George is in love or I'm a monkey's uncle.

On the face of it, this is unpredicted by either account. There is no imaginable question to which each disjunct could be an answer; nor can we concoct any set of premises which would entail that at least one of these disjuncts is true, but not that any particular one is true. But "monkey's uncle" disjunctions are clearly a special case. They require, first, that there be only two disjuncts and, second, that one of the disjuncts be clearly false. *I'm a monkey's uncle* is a special idiom which English speakers use precisely for this purpose. "Monkey's uncle" disjunctions invariably have the rhetorical effect of an emphatic assertion of the non-monkey disjunct. This effect is an implicature, generated by a Gricean argument along the following lines:

i. Speaker has asserted *A or B*, so she must have adequate evidence that at least one of *A* and *B* is true.
ii. *B* is obviously false.
iii. So the speaker must have evidence that *A* is true.
iv. However, she asserted something weaker than *A*, in violation of Quantity.
v. But she chose to make the violation blatant and so does not intend to convey the weaker proposition.
vi. She chose a form usually used to list alternative possibilities, and gave only one, clearly false, alternative to *A*.
vii. Hence, she wishes to convey that there are no alternative possibilities to *A*.

Unlike tautological disjunctions, "monkey's uncle" disjunctions involve intentional violation ("flouting") of a Maxim, and so, strictly speaking, are infelicitous. But the speaker of a "monkey's uncle" disjunction invariably

intends to convey a stronger proposition than that asserted, i.e. to convey whatever is expressed by the non-monkey disjunct. These disjunctions are thus invariably associated with a conversational implicature[8].

3.2.1. Entailing disjunctions again

In the information-based account, the infelicity of entailing disjunctions like (47) was derived from the Non-Vacuity Principle, which disallows utterances whose interpretation involves informationally vacuous operations.

(47) #Either Jane owns a truck or she owns a red truck

I now show that even on the evidence-based account, the same principle will be needed.

To assert (47) felicitously, a speaker ought to have evidence that the disjunction is true which is not sufficient evidence for the truth of either disjunct. But a speaker who has evidence that the disjunction is true inevitably has adequate evidence of the truth of the weaker disjunct.

In this case, though, the argument put forward earlier that a speaker who has evidence that *A* should not assert *A or B* is not applicable. This was an argument from the Maxim of Quantity, and held for cases in which *A* is stronger than *A or B*. In the current case, the disjunct which intuitively "should" be asserted is not stronger than the disjunction as a whole. So the Maxim of Quantity does not bear on the issue. Hence, we are forced back to the Maxim of Manner, and in particular to the Non-Vacuity Principle, to account for the infelicity of entailing disjunctions.

However, the Non-Vacuity Principle is something that we need anyway, in some form or another. The same principle, presumably, also accounts for observations unrelated to disjunction. It would account, for

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8. I think this implicature may be what Grice calls a generalized conversational implicature. Note that we derive the implicature even when the sentence is given out of any context. Ordinary conversational implicatures arise only in a particular conversational setting. Moreover, the "monkey's uncle" effect is not produced by just any obviously false disjunct. Even it is perfectly obvious to speaker and hearer that it is currently raining, the disjunction:

(i) Either George is in love or it's not raining right now

would be less successful as an emphatic assertion that George is in love than the "monkey's uncle" disjunction. One can innovate, but an element of hyperbole is required, as in:

(ii) Either George is in love, or I'm a duck-billed platypus.

instance, for the fact that the conjunction of entailing clauses is also generally infelicitous:

(48) Jane owns a red truck and she owns a truck.

On the Boolean perspective, conjunction is treated as set intersection. The intersection of the propositions expressed by the conjuncts is identical to the proposition expressed by the first conjunct, and hence this operation is vacuous. The conjunction of these two clauses is a violation of just the same kind as their disjunction.

A further reason to believe that entailing disjunctions are ruled out by considerations of informativity is that, like "monkey's uncle" disjunctions, they can be saved by conversational implicatures. Suppose you are an unwilling participant in a planned camping trip. I ask you what kind of weather you expect, and you reply gloomily:

(49) Either it'll rain or it'll pour.

Like the "monkey's uncle" disjunctions, this sort of assertion involves an intentional and blatant violation of the felicity conditions, again for the purpose of emphasis. What the speaker conveys is something along the lines of "it will undoubtedly rain", or perhaps, "the only alternative to rain is rain". Similarly, in an appropriate context, even sentence (47) above could be used to convey that Jane undoubtedly has a truck. This is possible because there is no difficulty in determining what kind of evidence supports the assertion. And when it is clear that the speaker intends her utterance to generate an implicature, the disjunction is in fact differently informative from its weaker disjunct.

3.2.3 Complex cases

Within the information-based account, the infelicity of complex examples like (50)-(51) was explained as the interaction of Relevant Informativity and Non-Vacuity.

(50) Either Jane owns a big truck, or she owns a truck and George owns a stationwagon.

(51) Either Jane owns a red truck, or she owns a truck and she's happy.

The Non-Vacuity Constraint has a place in the evidence-based account, but Relevant Informativity has gone. So the question is whether there is a way to account for these example in the evidence-based account.

I would suggest that these examples take us back to the old problem that made examples with completely unrelated disjuncts unacceptable: there seems to be no kind of evidence that the speaker could have from which she could conclude that at least one of these disjuncts is true, without being able to conclude which one it is. Our world knowledge does not equip us with any reasonable argument from a single set of premises to the disjunctive conclusion that either Jane has a red truck or she has a truck and she's happy. Again, it seems that the strategy which informants adopt in order to make sense of (51) is to invent premises which would make such an argument possible. Something like this will work: Suppose the speaker has evidence that Jane has a truck. Suppose further that the speaker thinks that red trucks break down all the time, which would make Jane unhappy; but non-red trucks are reliable, which would make Jane happy. If a hearer could assume all of these as premises, the disjunction would be felicitous.

Let's go back now to (50). As I pointed out above (see section 1.3, p.17), this example is odd out of the blue, but fine once it is provided with something like the following context: We suppose that Jane and George are housemates, and are moving house, and that Q is wondering about the mechanics of their move:

(26) Q: How are they going to move all their stuff?
A: Well, either Jane has a big truck, or she has a truck and George has a stationwagon. Either way, they can get everything into their own cars.

What I said earlier is that this context provides a question to which each disjunct constitutes a possible and distinct answer. But the more basic property of the context is, I think, that it provides a premise (Jane and George can get all of their belongings into their own cars) which, together with additional premises pertaining to the sizes of trucks and stationwagons and so forth, forms a reasonable and easily recognized basis for believing that one or the other of the disjuncts is true.

The evidence based account of these complex cases improves upon the information based account in two ways. First, it is simpler. Second, it saves us from having to make use of the Maxim of Manner in a somewhat problematic way. In the account I offered above (section 1.3), I argued that disjunctions like (51) are ruled out as vacuous, not because one disjunct entails another but because, with respect to the relevant question, the disjunction as a whole gives the same information as one of the disjuncts. Hence, I argued, by the Non-Vacuity constraint, the speaker should have asserted that disjunct, not the disjunction.

The Non-Vacuity constraint is a formulation of one aspect of the restrictions imposed by Grice's Maxim of Manner. In the usual applications

of the Maxim of Manner, the Maxim has the effect of choosing between two possible utterances which would convey the same proposition *p*. This is the case in the application of the Non-Vacuity Constraint to rule out the assertion of entailing disjunctions in favor of the entailed disjunct. But the use of the Non- Vacuity Constraint in the earlier treatment of cases like (51) had the effect of choosing between two possible utterances which convey *distinct* propositions. In other words, in this application, the Maxim of Manner is determining not only how a proposition is conveyed, but also which proposition a speaker should choose to convey[9]. On the evidence based account, the Non-Vacuity Constraint plays no role in the explanation of the felicity conditions of the disjunctions considered in this section. We can thus maintain the condition in its simpler and less powerful form, allowing it to rule out only straightforwardly vacuous operations of union (and intersection).

4 Conclusion

I set out to provide an account of the felicity conditions of unembedded disjunctions, and wound up by giving two accounts. The first account is information-based: The felicity of an utterance is taken to depend upon how useful the information which it contains is to a hearer. The second account is evidence-based: A hearer expects a speaker to have evidence of the appropriate kind, and will find infelicitous any utterances for which, in her judgement, a speaker could not have the appropriate evidence.

As I have pointed out, there is a connection between the two accounts. The notion of "useful information" which I used in giving the information-based account was that of a proposition which provides an answer to a question. Now, when we have evidence for an assertion about some topic, we also have an answer to certain formulatable questions about that topic. The same holds when the assertion for which we have evidence is a disjunction: what we have is a disjunctive answer to a formulatable question about the topic. However, we have seen cases such as (44) above, in which it is hard to think of a question, but easy to find the theory which links the disjuncts. Hence my conclusion that the evidence requirement is more basic.

Tautological disjunctions provided further evidence in favor of the evidence-based account. While the utterance of a particular tautology at a given point in a discourse may well be infelicitous as a contribution, tautological disjunctions are not infelicitous *qua* disjunctions. However, they are clearly not informative. This throws doubt on an account in which informativity is a condition on acceptability.

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9. This observation is due to Zoltán Szabó.

There is a distinction, though, between a failure to convey information at all, and a failure to convey information perspicuously. I have argued that entailing disjunctions are infelicitous because one of their disjuncts makes no contribution to the informativity of the utterance. But there is independent evidence that vacuous operations lead to infelicity, so this observation is not particularly surprising.

The move from an information-based account to an evidence-based account is, I think, of general interest. The requirements imposed on discourse contributions by the Maxims of Relation and Quantity have received quite a lot of attention from linguists and philosophers. Less attention has been paid to the requirements of the Maxim of Quality, or to the interaction of these requirements with others. In my evidence-based account of the felicity conditions of disjunction, we see Quality and Quantity interacting. Quality requires that there be evidence; Quantity requires that the evidence not suffice to license a stronger assertion. If the hearer's world-knowledge tells her that these requirements cannot be jointly met, she finds the utterance infelicitous. It is not sufficient that an utterance provide information, or even that it provide relevant information. A felicitous utterance must provide information in accordance with the evidence in which it is grounded.

Some of the data discussed here further suggest that a felicitous disjunctive assertion need not be informative at all, at least in the straightforward sense of eliminating worlds from the context set. If this is so, it requires a revision of the assumption found in much work in the Stalnakerian tradition of formal pragmatics that update of the context set is a minimal requirement on the felicity of an assertion. There are already suggestions in the literature on update semanticsthat some assertions standardly function as tests of the context set, rather than as update operations. Klein, Moens and Veltman (1992) give just such an analysis of *might*: essentially, in this analysis, assertions of the form *might p* simply require the hearer to check that there is a *p* world in the context set, but do not result in any update. It is suggestive that felicitous assertions of modal possibility, like disjunctions, would normally be grounded in arguments, and not in direct evidence. Further investigation might reveal a pragmatically (and perhaps semantically) relevant distinction between assertions based on different types of evidence.

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