Questions and Relevance

Robert van Rooy

ILLC/University of Amsterdan
Nieuwe Doelenstraat 15
1012 CP Amsterdam, the Netherlands

Abstract

In this paper it is argued that the interpretation of an interrogative sentence is *underspecified* by its conventional meaning. A uniform but still *substantial* underspecified meaning is given, and it is shown how this underspecification can be resolved by making use of a *relevance* relation between propositions.

Key words: Context dependence, Questions, Relevance, Underspecification

1 Introduction

According to the appealing partition-based analysis of questions of Groenendijk & Stokhof (1982) one only resolves, or completely answers, a *wh*-question, when one answers, roughly speaking, by giving the *exhaustive* list of individuals *by name* who satisfy the relevant predicate. Ginzburg (1995) and others have argued, however, that the notion of *resolvedness* is sensitive to the *goals* of the questioner. In this paper I will show how a similar idea can be made precise: the idea that whether an answer to a *wh*-question is resolving or not depends on the *relevance* of the answer. The three main points I will argue for in this paper are the following: (i) the meaning of a *wh*-question is *not ambiguous* but *underspecified* instead; (ii) this underspecified conventional meaning is still *substantial*, leaving only some of the interpretation work to pragmatics, and (iii) *relevance* is the crucial pragmatic parameter that helps to *resolve* this underspecifed meaning.

2 Different readings of questions

According to Hamblin (1958, 1973), we answer a question by making a statement that expresses a proposition. Just as it is normally assumed that one knows the meaning of a declarative sentence when one knows under which circumstances this sentence is true, Hamblin argues that one knows the meaning of a question when one knows what counts as a good answer to the question. Taking both assumptions together, this means that the meaning of a question (interrogative sentence) can be equated with the set of propositions that would be expressed by the good linguistic answers. This gives rise to the problem what a good linguistic answer to a question is.

Groenendijk & Stokhof (1982) have argued that giving (or knowing) a good answer, means that one has to (be able to) give an *exhaustive* specification of the extension of the question-predicate. For instance, to know the answer to the question *Who walks?*, John needs to know of *each* single individual *whether* he or she walks. In general, Groenendijk & Stokhof argue that John knows in world v the answer to the question that is represented by $?\vec{x}A$ (where $\vec{x}$ is the sequence of variables $\langle x_1, ..., x_n\rangle$) if and only if the set of worlds that represents his knowledge-state is a subset of the denotation of $[[?\vec{x}A]]^{GS}_v$:

$$[[?\vec{x}A]]^{GS}_v \ = \ \{w \in W| \ [[\lambda\vec{x}A]]^w = [[\lambda\vec{x}A]]^v\}$$

The lambda term $\lambda\vec{x}A$ denotes in v the following set of n-ary sequences of individuals (for simplicity, the assignment function is ignored):

$$[[\lambda\vec{x}A]]^v \quad = \quad \{\vec{d} \in D^n| \ [[A]]^{v[^{\vec{x}}/_{\vec{d}}]} = 1\}$$

This above denotation might be called the *extension* of a question. To determine the corresponding *intension* we can, as always, simply abstract from the world. What results is the following *function* from worlds to propositions, or the *equivalence relation* below:

$$\begin{aligned} [[?\vec{x}A]]^{GS} &= \lambda v.\{w \in W| \ [[\lambda\vec{x}A]]^w = [[\lambda\vec{x}A]]^v\} \\ &= \lambda v\lambda w[\ [[\lambda\vec{x}A]]^v = [[\lambda\vec{x}A]]^w] \end{aligned}$$

Notice that this equivalence relation gives rise to a *partition* of the state space W. Thus, the intension of a question is a set of mutually exclusive propositions thought of as the set of all its alternative *exhaustive* answers.

Groenendijk & Stokhof's analysis of questions has a number of nice properties. First of all, on their assumption that the extension of a question is a proposition, they can straightforwardly explain why questions can freely be conjoined with declaratives when embedded under verbs like *know*. In particular, to account for *wh*-complements like *John knows who came to the party*, they don't need to postulate two separate verbs of knowledge, as others had to. Second, their analysis has the consequence that not only single and multiple *wh*-questions have denotations of the same category, but that also *yes/no*-questions are analyzed in the same way as *wh*-questions. [1] This has the important consequence, third, that they can give a general definition of *entailment* between all kinds of interrogatives simply by inclusion of intension. Thus, if Q and Q' are the intensions denoted by two questions, question Q is said to entail question Q' iff $Q \subseteq Q'$ (thinking of questions as equivalence relations). [2]

Still, the partition analysis of questions is not unproblematic. The main worry, perhaps, is that according to Groenendijk & Stokhof's (1982) *mention-all* analysis of questions, it is predicted that each question has at most one true and appropriate answer in a world. However, some interrogative sentences can be truly and appropriately answered in more than one way. Typical examples of such questions are given below:

(1) Where can I buy an Italian newspaper?

(2) Who has got a light?

These questions can intuitively be answered appropriately by mentioning just one place, or individual, i.e. you don't have to give an exhaustive list of places where you can buy an Italian newspaper, or persons that have got a light, respectively. Accordingly, they are called *mention-some*-questions.

On first thought it might seem that such examples are not really problematic for a mention-all analysis of interrogative sentences. The reason is that one can claim that although mentioning all relevant individuals would completely answer the *wh*-question, in practice it normally suffices to give only a *partial* answer.

However, *embedded questions* show that this strategy doesn't work. Consider the following sentence:

(3) John knows where he can find an Italian newspaper

In order for this sentence to be true, John needs to know only one (relevant)

[1] Take A to be a 0-ary property, i.e. a closed formula. In that case, A denotes in w either the (singleton set of the) 0-ary sequence $\{\langle\rangle\}$, if A is true in w, or the empty set, $\emptyset$, if A is false in w.

[2] From now on I will use 'question' both for an interrogative sentence and for the intension it denotes. I hope this double use of the notion will not lead to confusion.

place where he can find an Italian newspape. If the extension (truth value) of (3) depends on the extensions of its parts, it is hard to see how this can be accounted for if the extension of the embedded question in a world denotes what G&S predict: the proposition saying for each place whether one can buy here an Italian newspaper or not. What we are looking for in this case, intuitively, is a proposition saying for (at least) one place where one can buy an Italian newspaper in the actual world *that* you can buy one.

As it turns out, the latter kind of proposition is exactly what Hamblin (1973) predicts to be the *extension* of a *wh*-question. The Hamblin-meaning of the *wh*-question $?\vec{x}A$ is normally represented as follows:

$$[[?\vec{x}A]]^H = \{\{v \in W | [[A]]^{v[\vec{x}/\vec{d}]} = 1\} | \ \vec{d} \in D^n\}$$

In case it holds that for every $\vec{d} \in D^n$ there is a world w such that $\vec{d} \in [[\lambda\vec{x}A]]^w$, the above meaning is equivalent with

$$[[?\vec{x}A]]^H = \{\{w \in W | [[A]]^{w[\vec{x}/\vec{d}]} = 1 \ \& [[A]]^{w[\vec{x}/\vec{d}]} = 1\} | \ \vec{d} \in D^n \ \& \ v \in W\}$$

Slightly changing this meaning, we get the following *intension* and *extension*.

$$\begin{aligned} [[?\vec{x}A]]^{H*} &= \lambda v \lambda w[\exists \vec{d} \in D^n : [[A]]^{w[\vec{x}/\vec{d}]} = 1 \ \& \ [[A]]^{v[\vec{x}/\vec{d}]} = 1] \\ [[?\vec{x}A]]^{H*}(v) &= \lambda w[\exists \vec{d} \in D^n : [[A]]^{w[\vec{x}/\vec{d}]} = 1 \ \& \ [[A]]^{v[\vec{x}/\vec{d}]} = 1] \end{aligned}$$

A natural proposal that comes to mind now is to assume that *wh*-questions are in fact *ambiguous* between a mention-all and a mention-some reading. The role of pragmatics then is one of disambiguation: to determine under which circumstances the interrogative sentence receives what kind or reading. In fact, this is what I assumed in van Rooy (1999) and van Rooy (to appear).

3 Underspecification

Assuming that *wh*-questions are ambiguous between mention-all and mention-some readings, however, is unnatural. The standard ambiguity tests seem to indicate that a question is not ambiguous, but rather that its actual interpretation is *underspecified* by its conventional meaning. A standard way to determine conventional meanings in such situations is to assume that it is a *function* from the relevant contextual parameter to its actual interpretation. In general it is a trivial affair to come up with such a function. The *challenge*, however, is to find a function that (i) can *intuitively* count as the semantic, conventional meaning of a question; (ii) is *flexible* enough to allow for the different kinds of interpretations the question can receive, but (iii) demands only a *limited* amount of on-the-spot *reasoning* to the hearer to determine the question's actual/intended interpretation in a particular context. In this section I want to show how we can associate with an interrogative sentence a *substantial* meaning that in different contexts receive the desired interpretation. Moreover, I want to show how an ordering between propositions in terms of *relevance* can serve as the crucial contextual parameter.

We have seen above that according to Groenendijk & Stokhof (1982), a question denotes an equivalence relation between worlds, or equivalently, a partition. Also Zeevat (1994) assumes that a question gives rise to an equivalence relation – in fact, the same as Groenendijk & Stokhof predict. However, he derives this relation in a somewhat different way. Let us assume for concreteness that the question is just about the extension of (n-ary) property P. Then his analysis of the *wh*-question comes down to:

$$[[?xPx]]^Z \quad = \quad \lambda v \lambda w[Op(P,v) = Op(P,w)]$$

The idea behind this formula is that $Op(P,w)$ always has a *unique* value. But which value will this be? Zeevat proposes that in each world we ask for the *maximally informative* value of P,[3] and that this value is defined (roughly) as follows (for *who*, g is a group, for *how many*, g is a number):

$$Max(P,w) = \{g \in G | P(w)(g) \wedge \neg\exists g'[g' \neq g \wedge P(w)(g') \wedge P(g') \models P(g)]\}$$

Notice that this analysis – just like Groenendijk & Stokhof's one – predicts *wh*-questions to have a *mention-all* reading only. The reason is obvious: $Max(P,w)$ always contains just a unique element, and for each predicate P and world w there exists a one-to-one relation between $Max(P,w)$ and $P(w)$ itself. So, in this respect nothing is won.[4] However, I want to show that by slightly changing $[[\cdot]]^Z$ and $Max(P,w)$ we can define an underspecified, but still substantial, meaning to *wh*-questions that in appropriate circumstances receive a mention-all or mention-some interpretation.

If we want to account with one formula for both mention-all and mention-some readings of *wh*-questions, it is obvious that we have to give up rules like $[[\cdot]]^{GS}$ and $[[\cdot]]^Z$. The identity used in these formulas guarantees that we will end up with an equivalence relation, which we don't want in case of mention-some readings. Instead of $[[\cdot]]^{GS}$ and $[[\cdot]]^Z$, I will propose the following rule which

[3] Something similar is proposed by Beck & Rullmann (1999).

[4] Zeevat (1994) had no intention to improve on G&S's analysis in this respect.

gives to questions an *underspecified* meaning:[5]

$$[[?xPx]]^R = \{\lambda v[X \in Op(P,v) \cap O(P,w)]|\ w \in W\ \&\ X \in \wp(D)\}$$

Thus, two worlds v and w belong to the same proposition in $[[?xPx]]^R$ iff the sets $Op(P,v)$ and $Op(P,w)$ have an element in common (notice that $\emptyset \in \wp(D)$). Notice that this still gives rise to a partition in case in each world w the set $Op(P,w)$ contains exactly one element. This means that $[[\cdot]]^R$ gives rise to the desired partition in case of a *polar* question. However, in order to account for mention-some readings of *wh*-questions, we have to change Zeevat's definition of $Op(P,w)$ as well: it will no longer denote the *exhaustive*, or most informative value of P in w, but rather (one of the) *optimal* value(s) of P in w. What these optimal values are, however, depends on a notion of *relevance* (and effort). I will assume a relevance-based ordering relations between propositions, $\geq_R$,[6] and define an ordering between sets of individuals in terms of that. I will say that X is at least as 'good' a set with respect to property P as Y is, $X \geq_P Y$, iff the proposition saying that all elements of X have property P, $\lambda v[X \subseteq P(v)]$, is at least as relevant as the corresponding proposition involving Y.

$$X \geq_P Y \quad \text{iff} \quad \lambda v[X \subseteq P(v)] \geq_R \lambda v[Y \subseteq P(v)]$$

In terms of this, we define the orders '$>_P$' and '$\approx_P$' in the usual way. X is in $Op(P,w)$ iff X is (among) the smallest subsets of $P(w)$ optimal w.r.t.. $\geq_P$:

$$Op(P,w) = \{X \subseteq P(w)|\neg\exists Y \subseteq P(w)(Y >_P X)\ \&\ \neg\exists Z \subset X(Z \approx_P X)\}$$

In combination with $[[\cdot]]^R$ we see that whereas Groenendijk & Stokhof and Zeevat ask for the most *informative* true answer, I ask for the *most relevant* one with the *least effort* (the smallest set that gives optimal relevance). Relevance is *goal*-oriented (Merin, 1999), and the goal could be to resolve the questioners' *decision problem* (van Rooy, 1999). As a simple, but illustrative special case, we might assume that proposition A is more relevant than proposition B with respect to question Q, $A >_Q B$, exactly when A eliminates more cells of the background question/decision problem Q than B does:

$$A >_Q B \quad \text{iff} \quad \{q \in Q : q \cap A \neq \emptyset\} \subset \{q \in Q : q \cap B \neq \emptyset\}$$

In case Q is a *finer-grained* question than the denotation of $?xPx$ as calculated by Groenendijk & Stokhof and Zeevat – for instance in case the decision

[5] This formulation is slightly different from an earlier version, which, as pointed out to me by Nathan Klinedinst, made some wrong predictions.

[6] See van Rooy (2003) for a number of candidates and relations between them.

problem is how the world is like – we predict that the question gives rise to 'their' partition, and thus has a mention-all reading. Indeed, in that case $>_Q$ comes down to (one sided) entailment. Things change, however, when Q is not finer-grained. My decision problem might be to find out which way is best for me to go to get an Italian newspaper. It could be, for instance, that the *best* way to buy an Italian newspaper is at the station in u, at the palace in v, and that buying one at the station and at the palace is equally good in w. In that case, the old man

(1) Where can I buy an Italian newspaper?

is not predicted to give rise to a partition. The reason is that $Op(P, w)$ does not denote a singleton set: $Op(P, w) = \{\{\text{station}\}, \{\text{palace}\}\}$ which has a non-empty intersection with both $Op(P, u)$ and with $Op(P, v)$. The question will thus give rise to the expected mention-some reading: $\{\{u, w\}, \{v, w\}\}$. Notice that this result is not the same as the one predicted by Hamblin (1973). If we assume that in all three worlds we can buy an Italian newspaper at both the station and the palace and at no other place, but that the *best* places to do so are in the different worlds as described above, the Hamblin denotation will be $\{\lambda w[\text{I can buy an Italian newspaper at the station in } w], \lambda w[\text{I can buy an Italian newspaper at the palace in } w]\} = \{\{u, v, w\}\}$, whereas our denotation will be $\{\{u, w\}, \{v, w\}\}$. Thus, for us, but not for Hamblin, it is important what the 'best' places are.

In section 2 I argued that (some) questions should have a mention-some reading in order to account for the case that a sentence like (3) can be true in case John knows just of one place where one can buy an Italian newspaper.

(3) John knows where he can buy an Italian newspaper.

If we assume that this sentence is true in w just in case there is a proposition in $[[(1)]]$ that contains w such that all epistemic accessible worlds in w are contained in this set, we predict correctly. Thus, even if John only knows that one can buy an Italian newspaper at the station, sentence (3) is still predicted to be true.

4 Extending the analysis: Domain selection and Scalar readings

But our new analysis manages not only to give a uniform analysis to mention-some and mention-all readings of questions. It also helps to determine the **domain** over which the *wh*-phrase ranges. Suppose that the domain in the model has 3 individuals, $D = \{d, d', e\}$. Assume, moreover, that property P denotes $\{d\}$ in w, $\{d, e\}$ in w', $\{d'\}$ in v, $\{d', e\}$ in v', $\{d, d'\}$ in u, and

$\{d, d', e\}$ in u'. However, assume that with respect to our decision problem it is only relevant whether d and d' have property P. In that case Groenendijk & Stokhof and Zeevat predict that no two worlds are in the same cell of the partition, while we predict that the question denotation will be the following one: $\{\{w, w'\}, \{v, v'\}, \{u, u'\}\}$. The reason is that $OP(P, w)$ and $Op(P, w')$, for instance, have an element in common, i.e. $\{d\}$. Observe that in this case also $Op(P, u)$ and $Op(P, u')$ have one element in common: the *smallest set* that contains *all relevant* individuals that have property P: $\{d, d'\}$.

Ginzburg (1995) reminded us that sometimes a *coarse-grained* answer can *resolve* a question. Assuming that the meaning of a question is its set of resolving answers, this suggests that the **fine-grainedness** of the domain over which the *wh*-phrase ranges depends on context. However, our analysis suggests a different solution. In principle, the domain over which the *wh*-phrase ranges consists of objects of all kinds of granularity. The property denoted by 'I live in', for instance, has as its extension not only my precise address, but also (by means of a meaning postulate) all its coarser grained places. For instance, it contains also Amsterdam, the Netherlands, and the world: {address, Amsterdam, the Netherlands, etc.}. However, the resulting partition still depends on a certain level of granularity. Suppose the question is

(4) Where do you live?

Sometimes you hope that I will give my complete address. At other times you are happy with hearing the city I live in, or even just the country. Which answer is appropriate depends on your decision problem: what you want with this information. Suppose you want to send me a letter. Then $Op(P, w)$ will be the singleton set that contains my complete address: {address, Amsterdam, etc.}. The partition induced will thus be very fine-grained, and it seems as if the domain over which the *wh*-phrase ranges consists just of complete addresses, the most fine-grained objects. But suppose that you just want to know whether I live in an interesting enough city to visit. In that case, the smallest relevant set, i.e. the unique element of $Op(P, w)$, does *not* contain my complete address, but is something like {Amsterdam, the Netherlands, etc.}. Notice that according to our interpretation rule $[[\cdot]]^R$, two worlds are already in the same cell of the partition induced by question (4) if the city I live in in those two worlds is the same, irrespective of my exact address. Thus, the partition denoted by (4) will now be more *coarse-grained* than in the previous case, and it seems *as if* this is due to the fact that the *wh*-phrase ranges over more coarse-grained objects: cities, instead of full addresses. With interpretation rule $[[\cdot]]^R$, however, this is not really what is going on. We don't have to select the domain before we determine the meaning of the question. The domain depends partly on the question being asked and should thus be determined hand-in-hand with the meaning of the question.

Now consider **identification questions** like *Who is Muhammed Ali?* In different circumstances this question should be answered by either a referential (that man over there) or by a descriptive expression (the greatest boxer ever). Both can be modeled by concepts of different types: 'rigid' concepts versus 'descriptive' concepts, and it seems as if the *wh*-phrase ranges over a set of concepts of just one of those two types. But also now we can assume that the domain over which the *wh*-phrase ranges is just the set of all concepts, but that the partition induced does *as if* it quantifies only over a particular conceptual cover.

We can illustrate this by considering the following question also discussed by Aloni (2001):

(5) Who killed spiderman?

We know that either John did it, or Bill did it, and the killer either wears a blue mask or a green one, but we don't know who is who, e.g. we don't know whether John wears a blue or a green mask. This gives rise to 4 relevantly different worlds: u, where John did it and wears a blue mask; v where John did it wearing a green mask; w, where Bill did it and wears a blue mask; and x where Bill did it and wears a green mask. Intuitively, in this case, we have 4 concepts: {John, Bill, blue, green}. According to Aloni, however the *wh*-phrase either quantifies only over $A =$ {John, Bill}, or only over $B =$ {blue, green}, and which of those two so-called *conceptual covers* is used has to be determined by context. In the first case, this gives rise to partition $Q_A = \{\{u, v\}, \{w, x\}\}$, in the second case we get $Q_B = \{\{u, w\}, \{v, x\}\}$. However, we will see that already by assuming interpretation rule $[[\cdot]]^R$, together with the assumption that optimality is determined by relevance, we don't have to assume that the *wh*-phrase ranges only over the concepts of a particular conceptual cover, they just might range over *all* concepts. The only thing we have to do is think of *intensions* rather than *extensions*.

In order to intensionalize our analysis, we have to change the definition of $Op(P, w)$. We won't think of this anymore as a set of sequences of *individuals*, but as a set of sequences of *individual concepts* instead. In the following definition, $C(w) =_{def} \{\vec{c}(w)|\vec{c} \in C\}$.

$$\begin{aligned} Op(P, w) = \{C|C(w) \subseteq P(w) \ \&\ \neg\exists Y(Y(w) \subseteq P(w) \ \&\ Y >_P C) \\ \&\ \neg\exists Z(Z(w) \subset C(w) \ \&\ Z \approx_P C)\} \end{aligned}$$

Assume that the *goal*, or *decision problem*, α is to know the *name* of the culprit. In that case $Op(\lambda y Kill(y, s), u) = Op(\lambda y Kill(y, s), v) = \{\{\text{John}\}\}$, and $Op(\lambda y Kill(y, s), w) = Op(\lambda y Kill(y, s), x) = \{\{\text{Bill}\}\}$. Thus, the partition induced by question (5) with respect to goal α, Q_α, is $\{\{u, v\}, \{w, x\}\}$, which is exactly the same as Q_A. If we denote the goal to know what the culprit looks like by β, we can see that Q_β is $\{\{u, w\}, \{v, x\}\}$, which is exactly the same as Q_B. Thus – at least for this example – we don't have to assume that to determine the meaning of the question we have to assume that the *wh*-phrase ranges over a particular conceptual cover.

What about the following question in the same situation?

(6) Who is who?

Aloni assumes again that the two occurrences of 'who' quantify over different conceptual covers: e.g. the first one over $A = \{\text{John, Bill}\}$ and the second over $B = \{\text{blue, green}\}$. But also now we don't have to assume this to get the correct result, i.e. the following partition: $\{\{u, x\}, \{v, w\}\}$. Representing the question by $?yz[y = z]$, and assuming that y and z range over all concepts, it will of course be the case that the proposition expressed by $y = z$ can only be informative, and thus useful, in case the two concepts involved are non-identical. Assuming that the concepts 'John' and 'Bill', and 'blue' and 'green' are pairwise incompatible, we predict that $Op(\lambda yz[y = z], u)$ is either $\{\{\langle\text{John, blue}\rangle, \langle\text{Bill, green}\rangle\}\}$ or $\{\{\langle\text{blue, John}\rangle, \langle\text{green, Bill}\rangle\}\}$. Thus, in the identity either y ranges over $\{\text{John, Bill}\}$ and z over $\{\text{blue, green}\}$, or the other way around. In both cases we get what we were looking for: partition $\{\{u, x\}, \{v, w\}\}$.

Moreover, we don't have to make use of shifts of methods of identification to account for sequences like

(7) Q: Who is the man with the blue mask?
A: It's John.
Q: Who is Bill?
A: Bill is the one with the green mask.

Notice, finally, that if we assume interpretation rule $[[\cdot]]^R$ instead of rule $[[\cdot]]^{GS}$, we might account for the fact that sometimes we want to know *all*, and sometimes just *some*, of the relevant 'properties' of the individual in question. And indeed, there seems to be no convincing reason to assume that once we quantify over individual concepts, the mention-some vs. mention-all distinction suddenly disappears. It is not at all clear, however, how we could account for mention-some readings if we assume that *wh*-phrases range over conceptual covers. [7] On our analysis, things are straightforward. Consider (5) again. In case relevance just demands one concept, $Op(\lambda y Kill(y, x), u) = \{\{\text{John}\}, \{\text{blue}\}\}$ and thus contains two elements, it is predicted that you

[7] For similar reasons, I rejected an analysis of belief attributions in terms of a contextually given *unique* counterpart function in van Rooy (1997). More freedom should be allowed.

can truly answer the question in u in both ways. The question itself will have the following denotation: $\{\{u, v\}, \{u, w\}, \{w, x\}, \{v, x\}\}$. This seems to me a reasonable result: the set consists of the minimally resolving answers.

In general, our analysis suggests the following. The domain over which a *wh*-phrase ranges doesn't have to be selected *before* we determine the meaning of the question. Also, we don't have to determine the meaning of the question with respects to all kinds of different domains, and then select the domain whose question-meaning is the most relevant (as I suggested in van Rooy 1999). Instead, we don't determine the domain at all, though the relevant subset of the domain, the relevant level of granularity, and the relevant conceptual cover over which the *wh*-phrase seems to range is determined hand-in-hand with determining the meaning of the question itself.

Our analysis of questions in terms of utility accounts for other things as well. In particular, it accounts for the fact that resolving answers can have a **scalar** meaning. This is most obviously the case for questions like (8a) and (8b), that can already be accounted for by Groenendijk & Stokhof's interpretation rule $[[\cdot]]^{GS}$, or, equivalently, by $[[\cdot]]^{Z}$ together with Zeevat's $Max(P, w)$:

(8) a. How many meters can you jump?
b. In how many seconds can you run the 100 meters?

These examples seem obvious, because the scales involved can be ordered in terms of *entailment*. If you can jump (at most) 5 meters, $Op(P, w) = \{P(w)\} = \{\{0, 1, 2, 3, 4, 5\}\}$, you can also jump 4 meters, but not 6. Other, less obvious, examples involving scales are discussed by Hirschberg (1985). She notes that a sentence sometimes gives rise to a scalar implicature for which the underlying scale *cannot* be reduced to *entailment*. One example of such a scale is one induced by the following simple variant of a poker game. In this game each player gets 3 cards, and there are 3 different kinds of cards: aces, kings and queens. An ace has the highest value, a queen the lowest. In analogy with real poker, a pair of aces is more valuable than a pair of kings, but is worse than having a hand with all acess. In this situation, it seems that the following question does on its most natural reading not have the standard Groenendijk & Stokhof meaning with for each different distribution of cards a different cell.

(9) What cards did you have?

Instead, it seems that (9) rather denotes a partition where a world in which you had a pair of acess and a queen is in the same cell as a world where you had a pair of aces and a king. A world in which you had a triple of aces, however, is in a different cell. Notice that this follows from our analysis if from the *goal* with respect to which we determine the meaning of the question we can *derive* the value of the cards. But this seems straightforward, certainly in 'game-like' situations: the goal is to win, and winning depends exclusively on the value of one's cards. This latter explanation is based on Merin's (1999) explanation of why we conclude from Mary's answer 'My husband' to question 'Do you speak French?' that Mary herself doesn't speak French. The only difference is that we have put this much already into the meaning of the question.

Notice, finally, that, in general, a scalar questions does not have to give rise to a partition: it might receive a *mention-some* reading as well. Assume in our example, for instance, that we have 4 different kinds of cards, except for aces, kings, and queens, also farmers. Assume, moreover, that we all get 4 cards, and that a pair of farmers is equally valuable as a pair of queens, although having both pairs isn't more valuable than just having one of such pairs. In that case, having a pair of farmers and one of queens is equally valuable as having a pair of queens, so you have to mention only one of the pairs. It should be clear how this follows from our analysis.

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