Question meaning = resolution conditions

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Introduction To know the meaning of a declarative sentence is to know what the world should be like for the sentence to be true. To know the meaning of an interrogative sentence is to know what information is needed to resolve it. Like the meaning of a declarative sentence is equated with its truth-conditions—and identified with the set of worlds satisfying these conditions—the meaning of an interrogative sentence should be equated with its resolution conditions—and identified with the set of propositions that satisfy these conditions. While so much may seem common sense, traditional approaches to questions have failed to build on this insight. I will argue that to do so leads to a new view of question meaning, which shares the formal advantages of the partition theory of Groenendijk and Stokhof, but enjoys a greater generality.

Guidelines At the outset of their famous thesis, Groenendijk and Stokhof (henceforth G&S) lay out aims and principles of their enterprise: empirically, they want to account for various flavors of answerhood, entailment between declarative sentences featuring embedded interrogatives, and *interrogative entailment*, construed as follows: $\mu \models \nu \iff$ resolving μ implies resolving ν. Thus, e.g., (1-a) entails (1-b), which in turn entails (1-c).

(1) a. Who went to the party and who went to the cinema?
b. Who went to the party?
c. Did John go to the party?

As for the principles, they want these phenomena to be accounted for in a theoretically principled way. For instance, if questions are to express objects of a conjoinable type ([5]), then entailment and conjunction of questions should be the general type-theoretical notions, which amount to meaning inclusion and meaning intersection respectively.

On these grounds, G&S criticize the proposition-set theories of Hamblin, Karttunen, and Belnap. In these theories, the meaning of an interrogative is identified with a set of propositions, thought of as the *possible answers* to the question. Since it is not the case that any proposition that is an answer to (1-b) is also an answer to (1-c), if entailment amounts to meaning inclusion, (1-b) will not entail (1-c); worse, if coordination amounts to intersection, (1-a) is predicted to have no answers at all. G&S take these observations to "clearly indicate that the Karttunen framework assigns the wrong type of semantic object to interrogatives".

Granted that the mentioned theories fail to satisfy G&S's requirements, is the charge against the *type* justified? On the one hand, the notion of interrogative entailment requires that $\mu \models \nu \iff \mathsf{Res}(\mu) \subseteq \mathsf{Res}(\nu)$, where $\mathsf{Res}(\mu)$ is the set of propositions that contain enough information to resolve μ. On the other, G&S's constraints require that entailment amount to meaning inclusion: $\mu \models \nu \iff [\![\mu]\!] \subseteq [\![\nu]\!]$, where question meaning is what we are after. There is an obvious way to satisfy these requirements: identify the meaning $[\![\mu]\!]$ of a question with the set $\mathsf{Res}(\mu)$ of propositions by which it is resolved. This shows that getting interrogative entailment right is perfectly compatible with having questions express sets of proposition, so long as these propositions are construed not as *possible answers*, but rather as the *resolving bodies of information*. And the same holds for conjunction: since resolving a conjunctive interrogative $\mu \wedge \nu$ amounts to resolving both μ and ν, we have $\mathsf{Res}(\mu \wedge \nu) = \mathsf{Res}(\mu) \cap \mathsf{Res}(\nu)$.

Issues What objects are question meanings in this view? They are sets of propositions. But not any set of propositions qualifies: for, if p resolves μ, then any stronger proposition $q \subset p$ will resolve μ as well. Thus, question meanings are *downward closed* sets of propositions. These objects have been called *issues* in recent work on inquisitive semantics ([2]), where their formal properties have been investigated. The present contribution is meant as an argument for the adoption of issues as question meanings, and as a discussion of how the resulting approach differs from—and improves on—both G&S's approach and proposition-set approaches.

The most general solution Identifying question-meanings with issues is not only the simplest, but also the most general solution to G&S's problem: for any definition $[\![\cdot]\!]$ of question meanings that satisfies G&S's requirements, the space of questions meanings ordered by entailment can be embedded in the space of issues ordered by inclusion. This holds in particular for G&S's own theory, in which questions express equivalence relations on the space of possible worlds: if μ expresses the relation $\approx$, then this can be faithfully encoded as the issue $I_{\approx} = \{p \mid \text{ for all } w, v \in p,\ w \approx v\}$. And entailments are preserved.

However, by taking questions to express equivalence relations—or, equivalently, partitions of the logical space—G&S constrain their semantics with an unnecessary assumption, namely, that questions have exactly one true complete semantic answer at each world. This limits the scope of their theory, depriving it of the possibility to deal with ordinary questions such as (2), which can be truthfully resolved in several ways.[1]

(2) What is a typical French name?

In our view, (2) has as good resolution conditions as any other question: it is resolved by those propositions which entail, for some x, that x is a typical French name. Similar arguments apply to other sort of questions that are problematic for partition semantics, such as choice questions ([1],[3]), conditional questions ([4],[7]), and which-questions interpreted à la Velissaratou ([7]). At the same time, unlike other approaches designed to deal with such questions (e.g. [1]), our theory meets G&S's requirements: question entailment and conjunction amount to the general type-theoretic notions. Moreover, the present approach is theoretically principled from a more abstract perspective as well: for, the space of issues ordered by entailment has a natural algebraic structure (Heyting algebra, see [6] and [2]). Conjunction and disjunction perform the algebraic operation of *meet* and *join* in this space, which are responsible for their standard logical properties.

Conclusion Conceptually, resolution conditions are a, if not *the*, natural candidate for the role of question meanings. Practically, identifying question meanings with resolution conditions gives the simplest and most general way to satisfy G&S's requirements, allowing us to combine the conceptual and formal advantages of G&S's approach with the greater generality of proposition-set approaches.

References [1] Belnap (1982): *Questions and answers in Montague grammar.* [2] Ciardelli, Groenendijk & Roelofsen (2012): *Inquisitive Semantics.* [3] Groenendijk & Stokhof (1988): *Type-shifting rules and the semantics of interrogatives.* [4] Mascarenhas (2009): *Inquisitive Semantics and Logic.* [5] Partee & Rooth (1983): *Generalized conjunction and type ambiguity.* [6] Roelofsen (2014): *Algebraic foundations for the semantic treatment of inquisitive content.* [7] Velissaratou (2000): *Conditional questions and which-interrogatives.*

[1] While G&S eventually develop a strategy to deal with such questions ([3]), this leads them to assign different semantic types to different sorts of questions, giving up the advantages of a uniform treatment.