Roelofsen and Dotlačil’s contribution illustrates the general applicability of dynamic approaches to question semantics, including when it comes to accounting for composition, as well as its potential for covering new empirical ground. In this note, I would like to emphasize one particular aspect of the idea which underlies much of the empirical parts of Roelofsen and Dotlačil’s argumentation, namely, the issue of how fine-grained question representations should be, which we can call the granularity of our theory of questions. As Roelofsen and Dotlačil briefly mention in their conclusion, their theory is highly granular, in a way that I will make clear below. I will argue that this property of dynamic approaches to questions opens a lot of analytical possibilities, and illustrate this by taking the example of how to analyse short answers.

1 Question granularity

Different theories of questions are able to make more or less distinctions between different questions. From the precise set of distinctions each representation of question makes, we can derive a hierarchy of sorts between them. At the bottom we find the partition theory of Groenendijk and Stokhof (1984), which identifies questions with partitions of the space of possible worlds. This theory does not easily distinguish (1a) and (1b), because it will most straightforwardly map them to something like (2a) and (2b) (simplifying a lot), which are the same object.

(1) a. Who has a car?
   b. Who does not have a car?

1 In spite of his name being associated to the answer set theory, which I am going to argue is more granular, Hamblin’s early discussion of the topic in Hamblin (1958) suggests that he intended answer sets to be such that there is only one true answer per world, making his approach isomorphic to the partition theory. Thus the partition theory is perhaps the earliest modern theory of question meanings.
The identification of (1a) and (1b) is problematic, because their conversational effect is quite different. The clearest problem is that these questions can have a *mention-some* reading, where the addressee is expected to provide just one example of a person who has a car. Thus, in the appropriate context, (3a) is perceived to be a full answer to (1a), and does not implicate either ignorance or non-cooperativeness on the part of the answerer, but it is not in general judged to be a full answer to (1b) (outside contexts where it is equivalent to a negative answer); the situation is reversed for (3b). However, there is no way to derive this pattern if we work from the object in (2), because the logical relationships between (3a) and (3b) and this object are fundamentally the same. Similar difficulties arise when it comes to deriving weakly-exhaustive or intermediate-exhaustive answers to questions (described in Cremers and Chemla 2016, a.o.).

(3)  
- a. Mary has a car.  
- b. Mary does not have a car.

Probably for these reasons, while the partition theory has been used to define a notion of relevance in discourse models (after Roberts 1996, a.o.), recent work on question semantics has tended to prefer either inquisitive semantics\(^2\) or the answer set approach of Hamblin (1976) and Karttunen (1977).\(^3\) Let us focus for now on answer set theories. Using answer sets, (1a) and (1b) can be represented as (4a) and (4b) respectively, which is much more promising as a basis for the analysis of *mention-some* questions; for a start, (3a)’s denotation is part of (4a), but not of (4b).

(4)  
- a. \(\lambda w. \text{has-a-car}^w(x): x \in D_e\)  
- b. \(\lambda w. \neg \text{has-a-car}^w(x): x \in D_e\)

One of the empirical phenomena Roelofsen and Dotlačil rely on to illustrate the benefits of their proposal is the uniqueness presupposition of singular *which*-questions. This is a topic where issues of granularity have played an important role in earlier proposals. As illustrated in (5), singular *which*-phrases trigger a uniqueness presupposition that plural *which*-phrases do not. The influential analysis of Dayal (1996) is, as Roelofsen and Dotlačil explain, globalist: it derives the presupposition from the overall representation of the question, through an operator that takes the whole question as its argument. For such an approach to work, if we are to derive a difference between (5a) and (5b).

\(^2\) In particular, the early version of inquisitive semantics introduced by Mascarenhas (2009) is defended on the basis of its higher granularity relative to partitions.  
\(^3\) Hamblin-style questions and Karttunen-style questions have different types, respectively \(\{s \rightarrow t\}\) and \(s \rightarrow \{s \rightarrow t\}\), where \(\{\}\) is a type constructor for sets. In principle, the richer type of Karttunen-questions allows for a lot more granularity, but if we take into account certain systematicities in how Karttunen denotations are derived, the two systems have a similar level of granularity.
and (5b), it is essential that they should have different representations. Fortunately, in answer set theories, they do: (6a) and (6b), respectively, are reasonable candidates.\footnote{Here I am glossing over issues related to the exact interpretation of the restrictor. Throughout what follows, we simply assume that the extension of \textit{dog} does not vary across the context, and write \textit{dog}(x) without specifying a world parameter. This is for a technical reason: without this assumption, aligning static and dynamic systems is trickier, because dynamic systems are not usually equipped to distinguish the restrictor and the scope of an indefinite determiner. I do not think this limitation is insurmountable but removing it would require complicating the dynamic system even further.}

(5) a. Which dog barked? \(\leadsto\) A single dog barked.
    b. Which dogs barked? \(\not\leadsto\) A single dog barked.

(6) a. \(\lambda w. \text{barked}^w(x): x \in D_e, \text{dog}(x), |x| = 1\)
    b. \(\lambda w. \text{barked}^w(x): x \in D_e, \text{dog}(x)\)

However, in the framework of inquisitive semantics, the possibility of such a globalist analysis disappears. Indeed, inquisitive semantics is less granular than the answer set theories, and will not distinguish (6a) and (6b). Inquisitive semantics identifies questions with sets of states, states being \textit{downwards-closed} sets of worlds: if \(s\) is a state in \(p\), all subsets of \(s\) are in \(p\). There is a natural mapping between inquisitive propositions and answer sets: we get an answer set from an inquisitive proposition by collecting its maximal states under set inclusion, and we get an inquisitive proposition from an answer set by downwards-closing it. The operators \textit{ALT} and \textit{INQ} defined in (7) implement this mapping.

(7) a. \textit{ALT}(p) = \{s: s \text{ is maximal in } p\}
    b. \textit{INQ}(S) = \{s: \exists s' \in S. s \subseteq s'\}

The operator \textit{INQ} does not make for an injective mapping: if the answer set contains propositions that are logically stronger than others, these propositions will not be visible in the inquisitive denotation obtained from \textit{INQ}, in the sense that we would get the same thing without them in the answer set. Ciardelli et al. (2017) provide an argument for this property based on conjunctive questions: the natural definition of conjunction in the answer set world can lead us to predict spurious alternatives, which downwards-closedness eliminates. Nevertheless, this loss of granularity is problematic for the globalist analysis of \textit{which}-questions. Indeed, \textit{INQ} maps (6a) and (6b) to the same inquisitive propositions: once we adopt downwards-closedness, the natural analysis of \textit{which}-phrases as existentials whose domain is determined by the number leads us to predict exactly the same semantics, and presumably the same pragmatic behavior, for singular and plural \textit{which}-questions.

If we want to model singular \textit{which} in the inquisitive framework (as Champollion et al. (2017) do) we have to adopt a localist account: some kind of uniqueness or
exhaustivity must already be present at the level of the which-DP, as otherwise number will make no difference to the meaning of any clausal constituent. As Roe-lofsen and Dotlačil discuss however, the predicted presuppositions under an account of this kind will easily be too strong. The only way out of this conundrum is to introduce extra granularity in our representation of clauses: in Roelofsen and Dotlačil’s proposal, it will come from the presence of discourse referents.

2 Dynamic questions as flat categorial questions

We have seen that the analysis of singular which-questions appears to demand a level of question granularity that is above that of basic inquisitive semantics, and at least comparable with answer set theories. It has been argued repeatedly, however, that answer set theories are themselves insufficiently granular, in particular by defenders of categorial (or structured) approaches. One way of thinking of categorial theories is that they represent questions as indexed answer sets where each propositional answer (or long answer) is associated to a witness (or short answer), an element of the same type as the wh-gap. Thus a categorial question will be represented by its domain, the set of its witnesses, and an answer function that maps each witness to the corresponding long answer. As an example, a representation of (5a) in the spirit of Krifka’s (2001) “Structured Meanings” is given in (8). By applying the function to the domain, we can get the answer set; the operator APP defined in (9) does just that.

\[(\lambda x. \lambda w. \text{barked}^w(x); \{x: x \in D_e, \text{dog}(x), |x| = 1\})\]

\[(9) \quad \text{APP}(\langle F; S \rangle) = \{F(x): x \in S\}\]

APP is a surjection of categorial questions into answer sets, but not an injection, which is another way of saying that categorial questions are more granular. For instance, if a one-to-one mapping between dogs and owners is established in the context, at least under certain assumptions on composition, the answer set of the whose-question in (10a) will be the same as that of (5a). However, as seen in (11), these two questions have different short answers. The higher granularity of categorial questions lets us properly distinguish (5a) and (10a), for which a sketch of a categorial denotation is given in (10b).

5 We will prefer the term witness here, so as to preserve short answer to refer to the linguistic construction.
6 Proof: if \(S\) is an answer set, \(\text{APP}(\langle \lambda p; S \rangle)\) is \(S\).
7 Some related discussion is found in von Stechow (1996), as part of an argument about composition rather than about question semantics.
Whose dog barked?

⟨\(\lambda x. \lambda w. \text{barked}^w(y. \text{dog} - \text{of}(x, y)); \{x: x \in D, \exists y. \text{dog} - \text{of}(x, y)\}\)⟩

a. Q: Which dog barked?
   A: Mary’s (dog)/Rex/The white dog.

b. Q: Whose dog barked?
   A: Mary’s (dog)/*Rex/*?The white dog.

Krifka’s (2001) defense of categorial questions is based in large part on prosodic focus in question-answer pairs, and is also essentially an issue of granularity: the problem is that one needs to make reference to the witnesses to state the rules accurately, and answer sets do not let us do that. Xiang (2021) also argues for a categorial approach on the basis of quantificational variability effects, where again the argument is that we need access to witnesses to state the semantics of quantificational adverbs like mostly when associated with questions.

Where do these considerations leave dynamic theories of questions? Such approaches are in fact formally very similar to categorial theories, in that they include a representation of witnesses through the referents introduced by or associated to wh-words. This makes it possible, at least in the case of wh-questions which are always associated to a specific referent or set of referents, to recover a functional denotation from a question’s dynamic denotation. In the specific case of Roelofsen and Dotlačil’s proposal, we can define the operator \(\text{CAT}\) given in (12) to do this. \(\text{CAT}\) will map the dynamic representation of (5a), given in (13), to its categorial representation (8). \(\text{CAT}\) needs to be supplied with the referent the question is about (indicated as a superscript) as well as a starting context (indicated as a subscript). For a dynamic question whose wh-referent is \(u\), in starting context \(c\), \(\text{CAT}^u(c)(U)\) is a categorial question whose domain is the range of \(u\) across all the possibilities in output states of the question, and whose answer function is obtained through an operation that Dekker (1993) calls existential disclosure, where we collect all output possibilities where \(u\) has a certain value.

8 Some speakers find the definite answer acceptable with certain intonation patterns, but it then conveys speaker ignorance as to the owner of the dog; in contrast, it is judged to be a complete answer to the which-question.

9 This is true in Roelofsen and Dotlačil’s proposal but also in earlier work such as Aloni and van Rooy (2002) or Haida (2008).

10 This is not necessarily the only way of going about it. Note that it generalizes to multiple-wh cases as long as we allow vectors of referents as indices for \(\text{CAT}\), producing categorial functions whose argument is a product type.

One small difference between (8) and the output of \(\text{CAT}\) for (13) is that the domain includes all atomic dogs that might have barked, rather than all atomic dogs tout court. More significant differences would arise if we dropped the assumption that the set of dogs is fixed in the context. Note also that we
\[ \text{(12)} \quad \text{CAT}_c^u(U) = \left\{ \lambda x. \exists w. \exists G \in \cup U(c). w = w' \wedge x \in G(u) \right\} \]

\[ \text{(13)} \quad [u]; \text{ATOM}\{u\}; \text{dog}\{u\}; \text{barked}\{u\}; \text{max*}\{u\}; ?u \]

From the existence of \text{CAT}, we see that dynamic questions are at least as granular as categorial questions. The reverse is not true, since we can distinguish dynamic questions on the basis of the referents that are introduced inside the nucleus, while categorial questions only track the witnesses for the \textit{wh}-words. Thus (14a) and (14b) will be distinguished in Roelofsen and Dotlačil’s theory, because (14b) introduces a referent to the dog that (14a) does not, whereas they will be the same in a categorial theory, because the restrictors in both \textit{wh}-phrases are truth-conditionally equivalent.

(14) a. Which dog owner is here?
   \[ [u]; \text{ATOM}\{u\}; \text{dog-owner}\{u\}; \text{is}-\text{here}\{u\}; \text{max*}\{u\}; ?u \]

b. Which person who owns a dog is here?
   \[ [u]; \text{ATOM}\{u\}; \text{person}\{u\}; [v]; \text{ATOM}\{v\}; \text{dog-of}\{u, v\}; \text{is}-\text{here}\{u\}; \text{max*}\{u\}; ?u \]

It follows from these considerations that any argument for categorial theories based on granularity is also an argument for dynamic approaches to question semantics, which is why Roelofsen and Dotlačil can write as their last sentence:

Finally, since semantic values in InqD are more fine-grained than in static inquisitive semantics and other static propositional frameworks for question semantics, we expect that InqD may be particularly beneficial for the study of phenomena whose analysis has been argued to require sensitivity to sub-propositional semantic structure, including \textit{wh}-conditionals, quantificational variability effects, \textit{wh}-based free relatives, question embedding under emotive factive verbs, so-called ‘highlighting-sensitive’ discourse particles in questions, and distributivity effects in plural predication and free choice phenomena.

What about the arguments against categorial approaches? One big problem with categorial theories is that they assign different types to every sort of question: polar questions, single-\textit{wh} questions, multiple-\textit{wh} questions, degree questions are all different kinds of objects. Yet, certain attitude predicates like \textit{know} or \textit{wonder} can embed all kinds of questions, and questions of different kinds can be coordinated with \textit{and} and \textit{or}. To account for that, we need either to assume widespread

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are sort of cancelling the effect of max* in CAT, so as to recover potentially-overlapping propositions in the end; if one does not want to do that, \( x \in G(u) \) should be replaced by \( G(u) = \{ x \} \) in the answer function.
ambiguity, or to find a way to state the denotation of know, and, etc. that is compatible with a wide range of argument types, which is often tricky.\(^{11}\)

Here we reach what I think is one of the strongest arguments for dynamic approaches to question semantics, which is that they let us enjoy all the granularity of categorial approaches to questions, without any of the type-related difficulties. Indeed, dynamic questions are nothing more than dynamic propositions with specific semantic properties. This allows Roelofsen and Dotlačil to define, for instance, conjunction and disjunction in well-established ways that were originally proposed for declaratives, and still be able to account for coordinations of arbitrary questions, and even in principle for coordinations mixing questions and declaratives.

### 3 An example: the interpretation of short answers

Roelofsen and Dotlačil’s list of phenomena where the granularity offered by categorial theories seems empirically visible is missing at least one case, that of the interpretation of short answers, developed in Jacobson (2016). To focus on one of the most striking examples, consider the contrast between (15a) and (15b). What these examples show is that short answers to a which-question presuppose that the entity being referred to is in the restrictor, whereas long answers do not.\(^{12}\) As Jacobson explains, this goes against the common assumption that short answers are elliptical forms of long answers. Accounting for it requires a more direct analysis of how short answers are interpreted, which in turns requires enough granularity to access the witnesses.

\[\text{(15) Context: Ramses is a cat.} \]
\[\text{Which dogs ate?} \]
\[\text{a. Ramses ate.} \]
\[\text{b. Ramses ate.} \]

We can develop the dynamic analysis of this phenomenon, to illustrate the added benefits of the flatness of dynamic representations. In Jacobson’s (2016) analysis, the relation between the question and its short answer is syntactic: the question denotes a function (what we have called the answer function above), with type \(e \rightarrow s \rightarrow t\), the

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\(^{11}\) Among other difficulties, the strategy usually adopted for coordination consists in reducing question coordination to declarative coordination; this is what Krifka (2001) and Xiang (2021) both do. As I discuss in Enguehard (2021), sec. 2.2, this leads to clearly wrong results for polar questions.

\(^{12}\) The long answer in (15b) is only acceptable with specific intonation patterns and triggers the inference that the speaker is ignorant about the dogs or that no dogs ate, depending on the intonation; all this is expected given that it is not congruent to the question. There is no intonation pattern, however, that makes the short answer in (15a) acceptable.
short answer denotes an individual with type $e$, and they combine through functional application, yielding a proposition. A very unusual feature, in this analysis, is that an exchange that typically involves two utterances from different speakers is seen as a single construction. A question, on its own, is an incomplete sentence. This means that we do not immediately get from the analysis a characterization of how the question, by itself, affects the discourse context. We cannot reduce the meaning of a question to its potential to combine with answers: one may very well resolve the question with long answers, even using very different syntax, cf. (16), and conversely, a short answer may fail to resolve the question, cf. (17). This problem connects to a more general issue with categorial approaches, which is that due to the diversity and complexity of question types, it is difficult to integrate questions in models of discourse in a clean way.

(16) Q: Which dogs barked? A: All the barks I heard were from Rex.


We have seen that dynamic questions afford us the necessary granularity for such an analysis to work. We could import Jacobson’s account into the dynamic setting, by assuming that $\text{CAT}$ is used to recover an answer function when a question has to combine with a short answer, but we can also adopt a more direct analysis which preserves the property that questions and short answers constitute separate updates. To do this, we define in (18) an operator $\text{short}$, which asserts that a question referent has a certain value. Short answers are then assumed to involve a silent operator $\text{short}$, simply denoting $\text{short}$. Note that the basic idea at the root of this analysis is already found in van Rooy (1998), in a non-inquisitive dynamic setting.

(18) $\text{short}^u(x) = \lambda c. \lambda s. s \in c \land \forall \langle w; G \rangle \in s. \exists \langle w'; G' \rangle \in \bigcup c. w = w' \land x \in G(u)$

Using $\text{short}$, we can analyse a sequence of a question and a short answer as two full propositions which are related at the semantic level, through co-indexing. We preserve a separate analysis of the question’s update, and the short answer will not erase any inquisitiveness or any referents introduced by the question; at the same time, we do not need to assume that short answers involve ellipsis, and we can explain the inference observed in (15) straightforwardly.¹³ Thus we can reap the benefits of the high level of granularity, while maintaining a straightforward discourse model.

¹³ If Ramses is not a dog, then the output context of the question will contain no possibilities mapping the $\text{wh}$-referent (call it $u$) to Ramses, so that “$\text{short}^u$ Ramses” will be a contextual contradiction.
4 Discussion

We have seen that dynamic approaches to question representation are in a sense at the top of a certain granularity hierarchy, above even categorial theories, allowing us to model a variety of phenomena that have been argued to necessitate a categorial theory. At the same time, dynamic questions give us a straightforward characterization of a question’s discourse effects, and can be analyzed in a uniform way regardless of the nature and number of the wh-elements, unlike categorial questions.

Of course, there is more to a theory of questions than whether it is dynamic, categorial or based on answer sets. To mention just one difficulty, in my effort to focus the discussion on granularity, I have been brushing aside repeatedly the question of how to deal with potential variation in the denotation of the restrictor across the context. It is also not the case that having the required level of granularity always translates into a straightforward analysis. In fact, the definition of \textsc{short} and \textsc{cat} that I have offered above are not really in the spirit of Roelofsen and Dotlačil’s theory, in that they largely ignore the “inquisitive” part of “dynamic inquisitive semantics” and reconstruct notions of answerhood entirely from the referents. For this reason, one might argue that dynamic inquisitive semantics is in fact not a good basis for the analysis of phenomena that involve witnesses and have been modelled using categorial theory. There are also probably more sophisticated ways of incorporating the insights of categorial analyses in the inquisitive setting than what I have proposed here, making good use of the inquisitive structure.

Granularity can also be observed along other dimensions than what I have mentioned so far. In Enguehard (2021), I have argued that we want yes/no-asymmetry, that is, we want to distinguish polar questions from their counterparts based on the negation of their nucleus. Thus, (19a) and (19b) must be different. This is because of their different behavior in coordinations with respect to presupposition filtering, as well as the different biases they express (Büring and Christine 2000; Sudo 2013, a.o.).

\begin{equation}
\begin{align*}
(19) & \quad \text{a. Is Mary present?} \\
& \quad \text{b. Is Mary absent?}
\end{align*}
\end{equation}

Answer set theories, as well as the basic version of inquisitive semantics, do not validate yes/no-asymmetry. Krifka’s (2001) structured meaning theory, on the other hand, does: it represents (19a) and (19b) as (20a) and (20b), respectively. These two categorial questions have the same domain of two elements with type $t \rightarrow t$, but crucially, they have different answer functions. Thus, one might think that dynamic inquisitive semantics, which I have claimed is more granular, is also yes/no-asymmetric. Recall however that the mapping to categorial questions we defined
relied on the referents introduced by the wh-word. Since Roelofsen and Dotlačil do not assume that any specific referent is introduced in polar questions, and deal with them in a way that remains very close to basic inquisitive semantics, their proposal does not exhibit yes/no-asymmetry. In any case, the sort of yes/no-asymmetry found in Krifka’s theory is not in fact helpful to analyze the presupposition projection data I discuss in Enguehard (2021), because the connectives are not sensitive to it. Thus, dynamic or categorial approaches that incorporate yes/no-asymmetry on top of their representation of witnesses remain to be developed.

(20) a. \( \langle \lambda F. \lambda w. F(\text{present}^w(\text{mary})); \{\lambda p.p, \lambda p.\neg p\} \rangle \)

b. \( \langle \lambda F. \lambda w. F(\text{absent}^w(\text{mary})); \{\lambda p.p, \lambda p.\neg p\} \rangle \)

Finally, one may wonder whether there are inherent disadvantages from increasing the granularity of our theories. Going back to the case of short answers, there is a certain simplicity to the basic answer set account, where short answers are simply truth-conditional propositions, and the relation between short answers and questions is a specific instance of a general rule of question-answer congruence—and we need the congruence constraint to account for long answers, as in (16), even if we have a different analysis of short answers. The account is also highly modular, in the sense that one does not need to access the discourse context to interpret the answer, only to check that it is congruent; in our account, we need to go back to the question so we can supply the appropriately indexed short operator. Inasmuch as one thinks simplicity and modularity are legitimate scientific objectives and not just about aesthetics (perhaps because we can imagine they are necessary for learnability), it is disappointing to see question semantics move towards ever more complex theories, even if the increased granularity is well-motivated.

Here I want to draw a comparison to the case of presupposition projection. Presupposition projection has at some point been seen to motivate more complex views of sentence meanings, such as context change potentials (Heim 1983, a.o.) or trivalent propositions (Beaver and Krahmer 2001, a.o.). However, Schlenker (2008) and subsequent authors (George 2014; Rothschild 2011; Schlenker 2009, a.o.) have shown that the more complex representations can be derived from the earlier, simpler theories.

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14 A simple fix would consist in applying the mapping in reverse starting from the structured meaning approach. One would assume polar questions to involve a covert wh-word introducing a referent of type \( t \rightarrow t \). Again, this is not really in the spirit of the “inquisitive” part of the system.

15 In Enguehard (2021), I propose a yes/no-asymmetric version of inquisitive semantics, which is more granular than inquisitive semantics, but less so than categorial approaches. Like inquisitive semantics and unlike answer sets, it is not compatible with a non-localist account of the difference between plural and singular which-questions.

16 Jacobson (2016) argues that this modularity is an illusion, because a detailed account of the conditions for ellipsis will need to look at the discourse context in messy ways.
simple ones in systematic ways, so that at least as far as presupposition projection is concerned, we may still consider truth-conditional propositions to be the fundamental object of semantic theory. In a similar way, we can hope that our sophisticated, highly-granular accounts of question semantics can someday be shown to be logically necessary extensions of the simpler ones of earlier authors, or even of the declarative fragment of the system.

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