## Ways and reasons: probing the semantics of how and why questions

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- 1. Introduction. In the semantic analysis of how- and why-questions (HWQs), there is uncertainty about the nature of the semantic values ways or reasons they ask about, about how those enter the content of the question nucleus, and hence about the content of possible semantic answers. This uncertainty has left HWQs being understudied in semantics, despite their roles in philosophical debates about the notions of explanation and knowledge (e.g. [12],[13]). Using wh else data as a novel probe into HWQs' semantics, we argue: (i) Modulo obviation by an existential operator, how-questions (HQs) have the exclusivity property: they determine semantic answer sets whose members are mutually incompatible. (ii) This extends to why-questions (WQs) about reasons for physical events. But WQs about reasons for mental states lack exclusivity, even in the absence of obviation. (iii) Exclusivity as diagnosed by wh else correlates with the presence of the factive island (FI) effect. This supports current accounts of FIs ([1],[8]), while at the same time suggesting that HWQs do not discriminate between them.
- **2.** H/K semantics. Assuming HWQs are semantically parallel to other wh-questions ([5],[9],[13]), a H/K semantics ([3],[6]) yields (1b) and (2b) for (1a) and (2a). Here + and  $\times$  stand in for operations yet to be determined, whose content in turn depends on how the notions of reason and way are explicated.
- (1) a. How did Sam drown?
  (2) a. Why did the lights go out?
  b. {W+||Sam drowned||: W is a way}
  b. {R×||the lights went out||: R is a reason}
- **3. Exclusivity.** In a standard approach, the answer sets in (1b) and (2b) (and hence the nature of W, R, + and  $\times$ ) are probed by studying possible linguistic responses to (1a) and (2a). But clearly not all responses express semantic answers. What reponses do? Avoiding this source of uncertainty, we explore wh else ([4],[10]) as a novel, more direct, probe into the semantics of HWQs. We observe that (3a) and (4a) are infelicitous, except possibly in readings paraphrased by the modalized variants in (3b) and (4b).
- (3) a. (#)How else did Sam drown?b. How else could Sam have drowned?(4) a. (#)Why else did the lights go out?b. Why else could the lights have gone out?

This is parallel the who-question (5a), which is infelicitous unless a modalized reading paraphrased by (5b) is available. Here the sources of infelicity are transparent: (i) uniqueness of authorship ensures the question nucleus expresses a property that holds of a unique individual, ensuring exclusivity. (ii) *Else* triggers the additive presupposition (6a) that a salient individual  $x_0$  has the relevant property; and it subtracts that presupposed answer from the question set, as in (6b). Given exclusivity, the infelicity of (5a) can be credited to a conflict between the additive presupposition (6a) and the question's existence presupposition (6a), the requirement that the answer set, here (6b), have at least one true member.

(5) a. (#)Who else wrote this poem?
(6) a. [wrote this poem](x<sub>0</sub>)
b. Who else could have written this poem?
b. {[wrote this poem](x): x is a person, x≠x<sub>0</sub>}

This suggests that the infelicity of (3a) and (4a) is due to a conflict between the additive presuppositions (7a) and (8a) and the existence requirement that the answer sets in (7b) and (8b) have at least one true member. If so, the *wh else* data uncover exclusivity in the answer sets for the HWQs under consideration.

- (7) a.  $W_0 + [Sam drown]$  (8) a.  $R_0 \times [the lts went out]$  b.  $\{W + [Sam drown]: W \text{ is a way, } W \neq W_0\}$  b.  $\{R \times [the lts went out]: R \text{ is a reason, } R \neq R_0\}$
- **4. Existential obviation.** The conflict in (5a) is correctly predicted to be obviated by the possibility modal in (5b), which expectedly removes exclusivity. If the poem has more than one possible author, the additive and existence presupposition can be consistent. Likewise for the obviation cases (3b) and (4b). Their compositional structure is as in (13b) and (14b). In (3b) and (4b),  $\exists$  is the possibility modal. But  $\exists$  could be instantiated differently. For example, the acceptability of (11) and (12) suggests that the perfect aspect can contribute obviating existential quantification over times or events.

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(9) a. \exists [W_0 + [S \text{ drown}]] (10) a. \exists [R_0 \times [\text{the lts went out}]] b. \{\exists [W + [S \text{ drown}]]: W \text{ is a way, } W \neq W_0\} b. \{\exists [R \times [\text{the lts went out}]]: R \text{ is a reas., } R \neq R_0\} (11) How else has Sam impressed you? (12) Why else has Benedict complained?
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- **5. Factive islands.** *How* and *why* often seem to resist extraction over a factive embedding verb like
- *know*, e.g. (13a) and (14a) cannot ask about the way Sam drowned or the reason the lights went out.

  (13) a How does Betty know Sam drowned? (14) a Why does Betty know the lights went out?
- (13) a. How does Betty know Sam drowned?
  b. {K[W+[Sam drowned]]: w is a way}
  b. {K[R×[the lights went out]]: r is a reason}
- [1] and [8] offer competing accounts of this factive island (FI) effect. Both assume for (13a) and (14a) the question sets in (13b) and (14b), where K stands in for the semantic contribution of the embedding context (*Bettty know*), and wavy underlining marks the factive presupposition that K triggers. But the two accounts differ in the strengths of their assumptions about the answer sets for FI questions. [1] needs the premise that there exist at least two propositions in the answer set with incompatible factive presuppositions; [8] requires the stronger premise that all propositions in the answer set have incompatible presuppositions. [1], focusing on HQs, suggests that only the weaker premise of [1]'s account is justified. However, by uncovering exclusivity in (1a) and (2a), the *wh else* data in (3a) and (4a) provide independent support for the stronger assumption underlying [8]'s account, suggesting that indeed all answers in FI cases like (13b) and (14b) carry incompatible factive presuppositions. If so, the relevant premises of both accounts are justified, and discriminating arguments must come from elsewhere ([11]).
- **6. Two kinds of reasons.** Supported by intuitions about possible linguistic responses to HWQs, ways and reasons have been proposed to come in different kinds. [9] suggests that ways include manners and methods, while [12] takes reasons to include causes and grounds. These works also suggest a corresponding typology of HWQs, which differ in terms of what kinds of ways or reasons they are used to ask about. Given this, setting aside existential obviation, the obvious empirical question is whether the exclusivity uncovered above is tied to particular types of HWQs, or whether it is fully general. For HQs, we are not actually aware of clear cases where exclusivity fails to holds in the absence of obviation. However, WQs indeed appear to fall into two different groups with regard to exclusivity. Alongside examples like (4a), we also find cases like the (naturally occurring) example in (15a).
- (15) a. Why else are you angry at me?
  - b. Why else could you be angry at me?
- (15a) need not be interpreted as (15b), indicating that no implicit modalization is judged to be needed to obviate infelicity. Apparently, then, (4a) and (15a) contrast in acceptability in virtue of asking about different types of reasons, or reasons for different types of explananda. The conspicuous difference between (4a) and (15a) is that the former asks about the cause for a physical event (of drowning) while the latter asks about the reason for a mental state (of being angry). The natural hypothesis, then, is that causes of physical events are necessarily unique whereas causes for mental states need not be. As a beginning of a defense of this hypothesis, we suggest that the contrast between (4a) and (15a) can be replicated outside WQs, with causative predicates like *cause* or *make*. [14], who explicitly argues for the uniqueness of causes, reports that (16) (where *for the second time* is intended to exclude existential obviation) is contradictory. In contrast, we submit that there is no contradiction in (17).
- (16) Bill's sneezing caused Betty to catch a cold for the second time, and so did something else.
- (17) Bill's constant talking about hockey made Betty angry at him for the second time, and so did something else.
- **7. Conclusion.** Using additive *wh else*, the logical make-up of answer sets for elusive HWQs can be probed directly. According to this diagnostic, HWQs often but not always have answer sets of mutually exclusive propositions. Exclusivity can expectedly be obviated by existential operators. More surprisingly, there appear to be two types of WQs which differ in terms of exclusivity, presumably because of the types causes and effects the refer to. We suggest that this finding should to be interpreted in relation to proposals about the nature of causation and explanation (e.g., [7], [14], [12]).

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