On prolog-style multiple questions in natural language

Radek Šimík

University of Potsdam

simik@uni-potsdam.de

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Core claims:

- Contrary to a relatively common belief, presupposition-free multiple wh-questions—called prolog-style questions by Krifka (2001:310)—are attested in natural language, in particular in Czech.

- Despite the general availability of prolog-style readings of multiple questions in Czech, these readings are restricted by a number of grammatical properties of the multiple question, most prominently by the condition that the lower wh-word not be narrowly focused.

- The observed restrictions clarify why English and German lack prolog-style questions.

- The observed restrictions on prolog-style readings provide an indirect argument for a particular analysis of matching/list-readings, in particular one which relies on nested alternatives / contrastive topic-focus articulation.

1 Types of multiple question readings

The typology below draws on Wachowicz (1974); Pope (1976); Higginbotham and May (1981); Dayal (1996); Comorovski (1996); Krifka (2001) and is incomplete. In particular, it disregards echo-questions, conjoined questions, and wh-questions with more than two wh-words.

1.1 The (pair-)list reading

- Also called matching reading (Wachowicz 1974).

- This is probably the most uncontroversial and best studied reading of multiple wh-questions and there are many theories which attempt to account for their properties (see e.g. Higginbotham and May 1981; Kuno 1982; Engdahl 1986; É. Kiss 1993; Dayal 1996; Hagstrom 1998; Krifka 2001).

- *Presupposition:* Matching questions presuppose the exhaustification of the higher wh-phrase, i.e. the question only contains answers which provide information about each of the members of the set denoted by the higher wh-word.[1]

(1) We need to find out who ordered what at the conference dinner.
'For each person x at the conference dinner we need to find out what x ordered.'

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[1]Some authors propose that the presupposition is even stronger, e.g. that also the domain of the lower wh-phrase must be exhausted, cf. Higginbotham and May (1981).

1.2 Single-pair readings

It is generally assumed that single-pair readings are only felicitous if some relatively strong presuppositions are satisfied.

The single-event reading

- Also called quiz questions (Wachowicz 1974).

- *Presupposition:* There is exactly one event which satisfies the event predicate. That in turn entails that there is exactly one tuple which satisfies the predicate created by abstracting over the wh-bound variables.

- Provided that, it is possible that (2) is construed simply as a single question about the event is identified by the values for the wh-bound variables.[2]

  (2)   Who killed John Kennedy when?
         $?e_{\langle x,t \rangle}.e$ is the unique event of killing John Kennedy by x at time t

The reciprocal reading

- A subtype of the single-event reading.

- Questions which denote a set of exactly two alternatives of the form $\{P(x)(y), P(y)(x)\}$

  (3)   I know that John and Mary spoke with each other on the phone but I don't know who called who.
         $?e.e$ is the unique phone-call event and e is either John called Mary or Mary called John

The REF-reading

- They are similar to but not identical with echo-questions (cf. Pope 1976; Comorovski 1996)

- They could be modeled as single questions about the variable assignment function (on the assumption that there's no harm in putting variable assignments in the object language).

  (4)   A   But in the end she$_i$ brought it$_j$.
         B   Wait a minute, who brought what?
              $?g.g$ is the assignment function at c and $g(i)$ brought $g(j)$

1.3 The prolog-style reading

- An underspecified reading which apparently doesn't exist in English and German. Krifka (2001:310) calls such hypothetical questions to **prolog queries,** in which one can search for all pairs of entities which satisfy the relevant predicate.

  (5)   *Situation:* It's obvious that Karel is offended; probably somebody told him something which offended him.
         a. #Who told him what?

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[2]Another possibility, suggested by Wachowicz (1974), is to construe it as a conjoined question, i.e. a series of single wh-questions.

b. #Wer hat ihm wás gesagt?
   who has him what told
   'Who told him what?'   *German*

- Krifka hypothesizes that such a reading is ruled out because it "is cognitively too complex to be carried out in one go, as it asks for two things simultaneously, and we **can answer only one thing at a time**." (Krifka's boldface)

- But a corresponding multiple question in Czech is perfectly felicitous in the same context, cf. (6).

(6)   Kdo   mu co   řekl?
      who.nom him what.acc told
      'Suppose that somebody told him something; who was it and what did (s)he say?'

- Some more examples:

(7)   a.   Komu jsi   dnes s   čím   pomohl?
           who.dat aux.2sg today with what.instr helped
           'Assuming that you helped somebody with something today; who did you help and with what did you help that person/those people?'
      b.   Co   Karel dnes s   kým   řešil?
           what Karel today with whom discuss
           'Assuming that Karel had some things to discuss with somebody, what did he discuss and with which people did discuss it?'
      c.   Co   jsi   komu slíbil?
           what aux.2sg who   promise
           'Assuming that you promised something to somebody, what did you promise and to whom?'

2   Semantic properties of prolog-style questions

- Prolog-style multiple (double) questions are relatively contextually unconstrained. They simply present a (two-place) relation and wonder which pairs satisfy that relation (in some context, naturally).

- The meaning can be easily represented in all the standard approaches to question semantics; in fact, it's apparently the default meaning generated by all the approaches. Let's take our first example, repeated below:

(6)   Kdo   mu co   řekl?
      who.nom him what.acc told
      'Suppose that somebody told him something; who was it and what did (s)he say?'

(8)   a.   *Hamblin semantics*
           $\{x \text{ told him } y \mid x \in D_e^c \wedge y \in D_{\langle s,t \rangle}^c\}$
      b.   *Karttunen semantics*
           $\lambda p. \exists x \in D_e^c. \exists y \in D_{\langle s,t \rangle}^c.^\vee p = 1 \wedge p = {}^\wedge(x \text{ told him } y)$
      c.   *Groenendijk-Stokhof semantics*
           $\lambda w. \lambda w'. (\lambda x. \lambda y. x \text{ told him } y \text{ in } w \wedge x \in D_e^c \wedge y \in D_{\langle s,t \rangle}^c) = (\lambda x. \lambda y. x \text{ told him } y \text{ in } w' \wedge x \in D_e^c \wedge y \in D_{\langle s,t \rangle}^c)$

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d. *Structured meaning semantics*
$\langle \lambda\langle x, y\rangle . x$ told him $y; \in D_e^c \times \in D_{\langle s,t\rangle}^c\rangle$

- The domains out of which the values for the wh-bound variables are drawn are only weakly restricted. In our example, c restricts the domain of individuals to those somehow potentially related to Karel and the domain of propositions to those potentially offending to Karel. No "D-linking" or explicit domain setting is involved.

- This weak restriction on the wh-domains corresponds to the very weak (if any) presuppositions associated with prolog-style questions. Unlike in matching questions, there is no requirement on the exhaustification of the wh-domains. Unlike in single-pair questions, there is no requirement on the uniqueness of the answer. This leads to very relaxed answerhood conditions.

2.1 Possible and impossible answers

- Let's take the example from above. $(9B_3)$ is a functional answer; the infelicity of $(9B_4)$ shows that (9A) is a genuine multiple wh-question (the lower wh-word is not interpreted as a simple indefinite); the same is demonstrated by the felicity of $(9B_5)$: it is possible to answer 'I don't know' if we only can fill in information for one of the wh-words; $(9B_6)$ aims to show that the predicate under discussion may have an empty extension.

(9)   *Situation:* It's obvious that Karel is offended; probably somebody told him something which offended him.

     A   Kdo   mu co   řekl?
           who.nom him what.acc told
           'Suppose that somebody told him something; who was it and what did (s)he/they say?'

- All basic types of answers are available: $(10B_1)$ corresponds to a single-pair answer, $(10B_2)$ to a list answer, and $(10B_3)$ to a functional answer.

(10)   A   Kdo mu co řekl?
        B_1 David mu   řekl, že   je tlustý.
             David him told that is fat
             'David told him that he's fat.'
        B_2 David mu   řekl, že   je tlustý a   Marie mu   řekla, že   smrdí.
             David him told that is fat   and Marie him told   that stinks
             'David told him that he's fat.'
        B_3 Každý$_i$ mu řekl, co   si   o   něm myslí$_i$.
             everybody him told what refl about him thinks
             'Everybody$_i$ told him what he$_i$ thinks about him.'

- The following two answers demonstrate that (9A) is not a hidden single wh-question (that the lower wh-word is just an indefinite, for instance): $(11B_4)$ is infelicitous because the question associated with the lower wh-word is not addressed and $(11B_5)$ shows that it is possible to express (partial) ignorance if one of the value for one of the wh-words cannot be resolved.

(11) B_4#David.

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

B_5 Nevím, vím jen, že David mu něco řekl.
　　neg.know know only that David him something told
　　'I don't know, I only know that David told him something.'

- Finally, $(12B_6)$ shows that the predicate might even have an empty extension, which reflects the very weak presupposition associated with prolog-style questions.

(12)　B_6　Nikdo　mu nic　neřekl. Netuším,　proč je uražený.
　　　　nobody.nci him nothing.nci neg.told neg.have.idea why is offended
　　　　'Nobody told him anything. I have no idea why he's offended.'

2.2　Multiple negative bias questions

- Thanks to the weak presupposition, prolog-style questions are amenable to negative bias readings.

(13)　*Situation:* Karel is worried that somebody told his wife about his wife about his cheating on her. His friend is comforting him by saying

　　a.　Prosím tě, kdo jí mohl co říct.
　　　　please you who her could what tell
　　　　'Come on, surely nobody told her anything.'

3　Grammatical properties on prolog-style questions

- **Multiple wh-movement required** Multiple questions with a single wh-movement cannot have the prolog-style reading: compare (14a) with (14b). The question in (14b) only has the standard matching/list-reading and is associated with the characteristic presuppositions: It is felicitous only if the context provides a closed set of people in need of help and potentially even a closed set of things to help them with.

(14)　*Situation:* Karel has recently got a job of a student assistant. Now and then it happens that he helps some professor with something. At the end of the day, I'm asking him

　　a.　Komu jsi dnes s čím pomáhal?
　　　　who aux.2sg today with what helped
　　　　'Assuming that you helped somebody with something today, who did you help and what with?'

　　b.　#Komu jsi dnes pomáhal s čím?
　　　　who aux.2sg today helped with what
　　　　'Who did you help with what today?'

- **Accent on lower fronted wh-word not necessary** Unlike in English or German, the lower wh-word, if it is fronted, can behave as a clitic phonologically. Small capitals mark phrase-level stress and capitals mark main clausal accent. Also, compare the multiple wh-fronting cases in (15) with the single wh-fronting cases in (16); in the latter, the stress necessarily falls on the wh-word.

(15)　a.　[$_\phi$ KDO mu co]　[$_\phi$ ŘEKL]?
　　　　　who him what　told

　　b.　[$_\phi$ KOMU jsi　dnes s　čím] [$_\phi$ POMÁHAL]?
　　　　　who aux.2sg today with what　helped

(16)   a. [$_\phi$ KDO mu] [$_\phi$ řekl CO]?
          who him   told what

       b. *[$_\phi$ KDO mu] [$_\phi$ ŘEKL co]?
           who him   told   what

- **No adjunct wh-words** Prolog-style readings seem to be unavailable if one of the wh-words is an adverbial adjunct, compare (17a) with (17b). The only available reading for (17b) is the matching/list-reading.

(17)   *Situation:* Karel is an amateur mechanic and now and then repairs old electrical appliances for his friends. This weekend he's about to do some work again, I'm asking him

      a. Co   budeš o víkendu komu opravovat?
         what will.2sg at weekend who   repair
         'Assuming that you'll be repairing some stuff at the weekend, what will you be repairing and for whom?'
      b.?#Co   budeš o víkendu jak opravovat?
         what will.2sg at weekend how repair
         'Assuming that you'll be repairing some stuff at the weekend, what will you be repairing and in which way?'

4   Analysis

- **Descriptive generalization** Let us view the above data in terms of the generalization (18).

(18)   a. **Fronted wh-words** behave semantically/IS-wise on a par with pitch-accented constituents: Wh-arguments allow for "focus-projection", wh-adjuncts attract narrow focus.
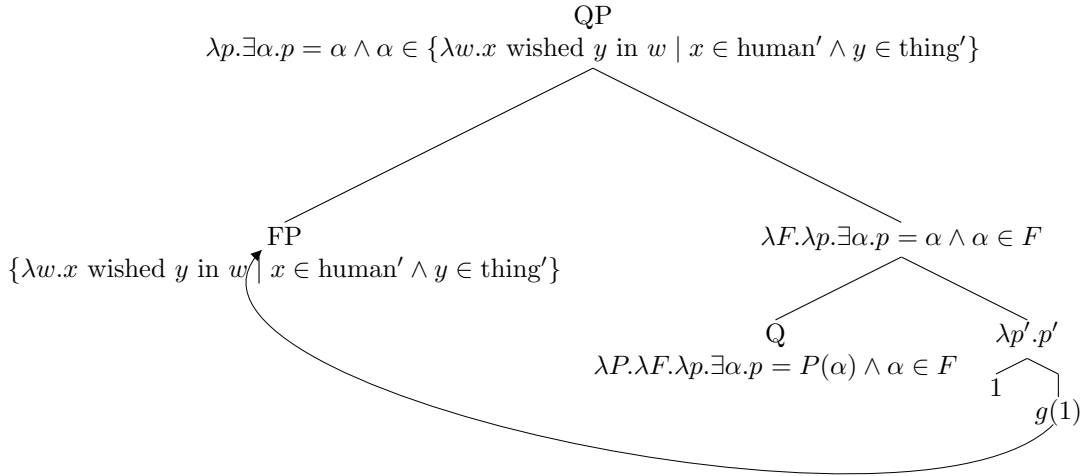   b. **In-situ wh-words** are always in narrow focus, even if they are arguments.

- **Assumptions** (tentatively following Hagstrom 1998; Krifka 2006)

(19)   a. Question operators associate with *focus phrases (FP)* rather than foci.
      b. There is no a priori restriction on the size or syntactic category of a focus phrase.
      c. Narrowly focused wh-words (in-situ arguments, adjuncts) form focus phrases by themselves.
      d. Wh-words which are not grammatically narrowly focused (fronted arguments) can be properly included in focus phrases.

- **Prolog-style reading** The focus phrase is the whole interrogative. Neither of the two wh-words is narrowly focused (both are fronted) and hence, the alternatives introduced by them can combine within a single focus phrase. This focus phrase then associates with the question operator, which creates a set of propositions. The operator Q is defined in a structured-meaning fashion: it has access to both the background (vacuous in this case) and the domain out of which the answer is selected (a set of propositions in this case).

(20)   [$_{FP}$ Kdo si   co   přál]?
         who refl what wished
        'Assuming that some people had wishes, who had a wish and what did they wish?'
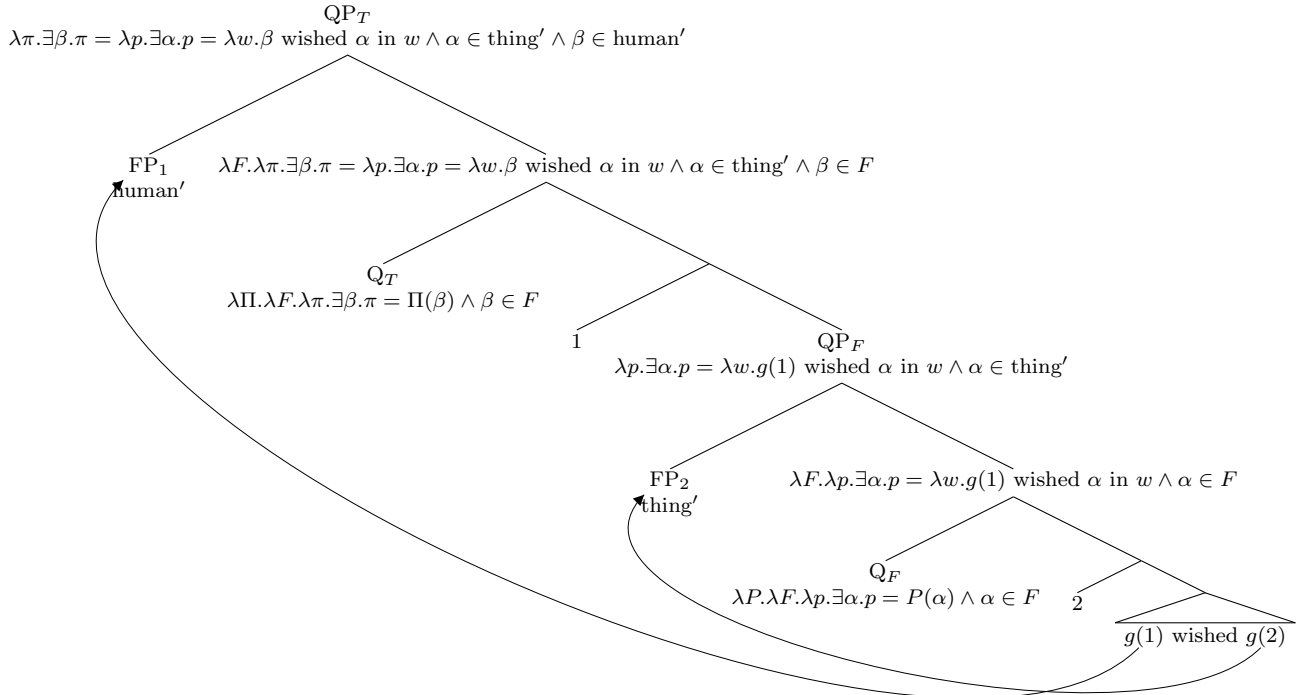
(21) *LF of (20)*

QP

$$\lambda p.\exists\alpha.p = \alpha \wedge \alpha \in \{\lambda w.x \text{ wished } y \text{ in } w \mid x \in \text{human}' \wedge y \in \text{thing}'\}$$

FP

$$\{\lambda w.x \text{ wished } y \text{ in } w \mid x \in \text{human}' \wedge y \in \text{thing}'\}$$

$$\lambda F.\lambda p.\exists\alpha.p = \alpha \wedge \alpha \in F$$

Q

$$\lambda P.\lambda F.\lambda p.\exists\alpha.p = P(\alpha) \wedge \alpha \in F$$

$$\lambda p'.p'$$

1

$$g(1)$$

- **Matching reading** At least one wh-word is narrowly focused and hence creates a focus phrase by itself. The alternatives introduced by each wh-word do not "mix" with each other, two focus phrases are formed, each of which is bound by an independent question operator. The hierarchy between the two operators—Q_F and Q_T—creates the effect of nested alternatives, just like in contrastive topic-focus structures (see e.g. Wagner 2009 for an analysis of contrastive topic-focus structures using two operators). In particular, Q_F creates a set of propositions (a question) and Q_T creates a set of sets of propositions (a set of questions), à la Roberts (1996); Hagstrom (1998); Büring (2003).

(22) [$_{FP_1}$ Kdo] si přál [$_{FP_2}$ co]?
who refl wished what
'Who wished what?'

(23) *LF of (22)*

QP_T

$$\lambda\pi.\exists\beta.\pi = \lambda p.\exists\alpha.p = \lambda w.\beta \text{ wished } \alpha \text{ in } w \wedge \alpha \in \text{thing}' \wedge \beta \in \text{human}'$$

FP_1
human'

$$\lambda F.\lambda\pi.\exists\beta.\pi = \lambda p.\exists\alpha.p = \lambda w.\beta \text{ wished } \alpha \text{ in } w \wedge \alpha \in \text{thing}' \wedge \beta \in F$$

Q_T

$$\lambda\Pi.\lambda F.\lambda\pi.\exists\beta.\pi = \Pi(\beta) \wedge \beta \in F$$

1

QP_F

$$\lambda p.\exists\alpha.p = \lambda w.g(1) \text{ wished } \alpha \text{ in } w \wedge \alpha \in \text{thing}'$$

FP_2
thing'

$$\lambda F.\lambda p.\exists\alpha.p = \lambda w.g(1) \text{ wished } \alpha \text{ in } w \wedge \alpha \in F$$

Q_F

$$\lambda P.\lambda F.\lambda p.\exists\alpha.p = P(\alpha) \wedge \alpha \in F$$

2

$$g(1) \text{ wished } g(2)$$

References

Büring, Daniel. 2003. On D-trees, beans, and B-accents. *Linguistics and Philosophy* 26:511–545.

Comorovski, Ileana. 1996. *Interrogative phrases and the syntax-semantics interface*. Dordrecht: Kluwer.

Dayal, Veneeta. 1996. *Locality in wh-quantification: Questions and relative clauses in Hindi*. Dordrecht: Kluwer.

É. Kiss, Katalin. 1993. Wh-movement and specificity. *Natural Language & Linguistic Theory* 11:85–120.

Engdahl, Elisabet. 1986. *Constituent questions*. Dordrecht: Kluwer.

Hagstrom, Paul. 1998. Decomposing questions. Doctoral Dissertation, MIT, Cambridge, MA.

Higginbotham, James, and Robert May. 1981. Questions, quantifiers, and crossing. *The Linguistic Review* 1:41–79.

Krifka, Manfred. 2001. For a structured meaning account of questions and answers. In *Audiatur vox sapientiae: A festschrift for Arnim von Stechow*, ed. Caroline Féry and Wolfgang Sternefeld, 287–319. Berlin: Akademie-Verlag.

Krifka, Manfred. 2006. Association with focus phrases. In *The architecture with focus phrases*, ed. Valéria Molnár and Susanne Winkler, 105–136. Berlin: Mouton de Gruyter.

Kuno, Susumu. 1982. The focus of the question and the focus of the answer. In *CLS: Papers from the Parasession on Nondeclaratives (Meeting of the Chicago Linguistic Society)*, ed. Robinson Schneider, Kevin Tuite, and Robert Chametzky, 134–157. Chicago, IL.

Pope, Emily. 1976. *Questions and answers in English*. The Hague: Mouton.

Roberts, Craige. 1996. Information structure in discourse: Towards an integrated formal theory of pragmatics. In *OSU Working Papers in Linguistics 49: Papers in Semantics*, ed. J. H. Yoon and Andreas Kathol, 91–136.

Wachowicz, Krystyna. 1974. On the syntax and semantics of multiple questions. Doctoral Dissertation, University of Texas, Austin.

Wagner, Michael. 2009. A compositional analysis of contrastive topics. In *NELS 38: Proceedings of the 38th Annual Meeting of the North East Linguistic Society*, ed. Muhammad Abdurrahman, Anisa Schardl, and Martin Walkow, volume 2, 455–468. Amherst, MA: GLSA Publications.