Introduction

1. Preliminaries

- Types of (matrix) questions

– *Wh*-questions (also called "constituent questions")

(1) a. Who wears a hat? *Single-wh question*
b. Who wears what? *Multi-wh question*
c. What does {every child, one of the children} wear? *Question with a quantifier*

– Non-*wh*-questions

(2) a. Does Anna wear a hat? *Polar/ Yes-No question*
b. Does Anna wear a hat or a bowtie? *Alternative question*
c. Does Anna wear a hat or not? *Polar alternative question*

– Non-canonical questions

(3) a. [— Anna wears a hat. —]Anna wears a WHAT? *Echo question*
b. Anna doesn't wear a bowtie, does she? *Tag question*
c. [I don't think we should have Onavi on our short list.] What does he know about semantics?
$\rightsquigarrow$ *I don't think Onavi knows any semantics.* *Rhetorical question*
d. Doesn't Anna wear a hat?
$\rightsquigarrow$ *I'm inclined to believe that she does wear a hat.* *Biased polar question*

2. How do we know the meaning of a question?

- What is the meaning of a declarative?

The meaning of a declarative sentence is modeled in terms of its **truth-conditional meaning** (Heim & Kratzer 1998). Its extension is a truth value (True or False or undefined); its intension is a proposition, i.e., a set of possible worlds where this sentence is true.

(4) a. $[\![\text{Anna wears a hat}]\!]^w = 1$ iff Anna wears a hat in w, and $[\![\text{Anna wears a hat}]\!]^w = 0$ otherwise
b. $[\![\text{Anna wears a hat}]\!] = \{w \mid \text{Anna wears a hat in } w\}$

- But, **what is the meaning of a question?**

Hard to answer directly — it makes no sense to say that a question is True/False. Instead, we usually start with the relation between questions, answers, embeddings, and kins of questions.

2.1. Question-answer relation

- Full/Short answers: A question can be responded directly by either a full sentence (*full answer*), or a constituent that specifies only the new information (*short answer*).

  (5) Who wears a hat?
  - a. Andy wears a hat.
  - b. Andy.

- Question-answer congruence: In an answer to a *wh*-question, the element corresponding to the *wh*-phrase in the question must be a focus. (von Stechow 1990; Rooth 1985, 1992)

  (6) Who invited Andy?
  - a. MAry$_F$ invited Andy.
  - b. [Mary's MOther]$_F$ invited Andy.
  - c. # Mary invited ANdy$_F$.

- Exhaustiveness of answers:

  In most cases, a proper answer needs to be exhaustive — it must specify all the true answers. Non-exhaustive answers must be ignorance-marked (by a rise-fall-rise contour, for example), otherwise they would give rise to an undesired exclusive inference.

  (7) Who wears a hat?
  - a. Anna and Cindy.\
  - b. Anna does .../
    ⇝ *I don't know if anyone else does.*
  - c. # Anna.\
    ⇝ *Only Anna wears a hat.*

  However, some questions (usually those with an existential modal *can*) admit non-exhaustive answers, called "mention-some questions". (Gr&S 1984).

  (8) Where can we get coffee nearby?
  (*w* : There are two coffee places nearby — Starbucks and Peet's.)
  - a. Starbucks.\
  - b. Starbucks and Peet's.\
  - c. Starbucks or Peet's.\

- Uniqueness: Singular-marked questions (i.e., the *wh*-complement is morphologically singular) are subject to a uniqueness requirement — they can have exactly one true answer. (Dayal 1996, 2016)

  (9) (*w*: The speaker knows that two of the girls wear a hat but doesn't remember whom exactly.)
  - a. Who wears a hat?
  - b. Which girls wear a hat?
  - c. # Which girl wears a hat?
    ⇝ *Exactly one of the girls wears a hat.*

2.2. Question-embeddings (also called "indirect questions")

- Questions can be embedded under various attitude predicates.

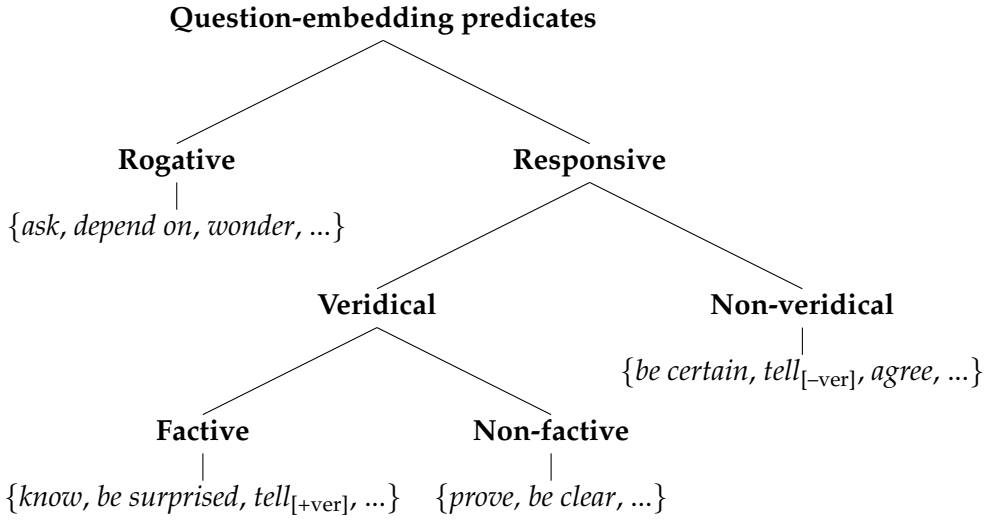

Figure 1: Typology of question-embedding predicates (after Lahiri 2002, Spector & Egré 2015, Uegaki 2015)

- Take the cognitive factive verb *know* for instance:

  1. *Wh*-knowledge is world-dependent (Gr&S 1984).

     (10) Jenny knows whether it is raining.
     a. ⇝ *If it is raining, (10) is true iff Jenny knows that it is raining.*
     b. ⇝ *If it isn't raining, (10) is true iff Jenny knows that it isn't raining.*

  2. Truth conditions: *Wh*-knowledge generally needs to be exhaustive, as in (11a), unless the embedded question is a mention-some question, as in (12a). Moreover, beliefs in false answers must be avoided, as in (11b) and (12b).[1]

     (11) John knows who wears a hat.
     a. For every individual x, if x wears a hat, John knows that x wears a hat.
     b. For every individual x, if x doesn't wear a hat, not [John believes that x wears a hat].

     (12) John knows where we can buy an Italian newspaper.
     a. For some place x, if we can buy an Italian newspaper at x, John knows that we can buy an Italian newspaper at x.
     b. For every place x, if we can't buy an Italian newspaper at x, not [John believes that we can buy an Italian newspaper at x].

  3. Quantificational variability (QV) effects: When modified by a quantificational adverbial (e.g., *mostly*, *partly*, *for the most part*), embeddings of questions are subject to QV effects.

     (13) a. For the most part, John knows who arrived.
     ⇝ *For most x such that x arrived, John knows that x arrived.*

[1] The (b)-conditions are after esp. Klinedinst & Rothschild (2011) for mention-all questions and George (2013) for mention-some questions. But, as argued by Xiang (2015, 2016: ch. 4), the actual no-false-belief condition is stronger than (11b) and (12b). We will return to this issue later.

b. John partly knows who arrived.
   ⇝ *For some x such that x arrived, John knows that x arrived.*

4. Homogeneity effects: *wh*-knowledge is homogenous.

   (14) a. John knows who arrived.
   ⇝ *For every individual x, if x arrived, John knows that x arrived.*
   b. John doesn't know who arrived.
   ⇝ *For every individual x, if x arrived, John doesn't know that x arrived.*

5. Selectional restriction: *believe*, the non-factive counterpart of *know*, cannot take question-complements.

   (15) a. * John believes who arrived.
   b. * John believes whether Andy arrived.

2.3. Kins of questions

- *Wh-* free relatives (*wh*-FRs): A *wh*-FR denotes a short answer of the corresponding question.

  (16) a. Mary ate [what John bought].
  b. John went to [where he can get help].

- Mandarin *wh*-conditionals: A *wh*-conditional is made of two *wh*-clauses with identical *wh*-items. It expresses a relation between the short answers of the questions denoted by the two *wh*-clauses, that is, a complete true short answer to the question denoted by the first *wh*-clause is also a true short answer of the question denoted by the second *wh*-clause.

  (17) a. Shei xian dao, shei xian chi.
  who first arrive, who first eat
  'Whoever arrives the first eats the first.'
  b. Nar neng mai kafei, wo qu nar.
  where can buy coffee, I go where
  'I will go to one of the places where I can buy coffee.'

- Other *wh*-containing constructions: correlatives, headed relative clauses, question-answer clauses in sign languages, statements with *wh*-indefinites or *wh*-FCIs (e.g., *whoever*), ...

2.4. Core issues on question semantics

- While it is relatively easy to understand the semantics of answers, embeddings, and non-interrogative *wh*-constructions (as they can be modeled in terms of truth conditions), to make conjectures about question semantics, we need to know the relation between questions and those constructions cross-linguistically and language-specifically.
  - Answers
    - Questions have full answers and short answers. In semantics, which type of answers is primary? (Hamblin-Karttunen semantics vs. categorial approaches)
    - How does the question-answer relation affect focus-marking?
  - Question-embeddings
    - What is the meaning of a question-embedding?

    - Which aspects of the meaning come from the embedded question, and which come from the embedding predicate?
    - Why is it that question-embeddings are subject to QV and homogeneity effects?
    - ...
  - *Wh*-containing constructions:
    - [Clausal level:] What *wh*-containing constructions are truly question-containing?
    - [Phrasal level:] What is the relation between *wh*-words in questions and those in statements?

- Exhaustiveness & Uniqueness
  - What causes exhaustiveness and uniqueness?
  - Why is it that certain questions (i.e., mention-some questions) can be interpreted non-exhaustively?
  - ...

- Question composition

  Knowing/Assuming the meaning of a question, how should we derive this meaning compositionally?

3. Views of canonical approaches

	A question denotes ...	**A *wh*-item denotes ...**
Hamblin Semantics:	a set of possible answers	a set of individuals
Karttunen Semantics:	a set of true answers	an $\exists$-quantifier
Categorial Semantics:	a λ-abstract/function	a function restriction
Partition Semantics:	a partition of worlds	a function restriction

Table 1: Canonical approaches of question semantics

- Hamblin/Alternative Semantics

  (18) a. $[\![\text{which cat}]\!] = \{x \mid x \text{ is a cat}\}$
  b. $[\![\text{which cat meows}]\!] = \{x \text{ meows} \mid x \text{ is a cat}\}$

- Karttunen Semantics

  (19) a. $[\![\text{which cat}]\!] = [\![\text{some cat}]\!]$
  b. $[\![\text{which cat meows}]\!]^w = \{x \text{ meows} \mid x \text{ is a cat} \wedge x \text{ meows in } w\}$

- Categorial approaches

  (20) a. $[\![\text{which cat}]\!] = \lambda P \lambda x[\text{cat}(x) \wedge P(x)]$
  b. $[\![\text{which cat meows}]\!] = \lambda x[\text{cat}(x) \wedge \text{meows}(x)]$

- Partition Semantics

  (21) a. $[\![\text{which cat}]\!] = \lambda P_{\langle e,st\rangle} \lambda x[\text{cat}_@(x) \wedge P_w(x)]$
  b. $[\![\text{which cat meows}]\!] = \lambda w' \lambda w[\lambda x[\text{cat}_@(x) \wedge P_w(x)] = \lambda x[\text{cat}_@(x) \wedge P_{w'}(x)]]$

- **Questionnaire**

  Send me an email (*yimei.xiang@rutgers.edu*) with answers to the following questions by Friday:

  (22) a. Are you taking this course for credits?
  b. What is your background in semantics and logic?
  c. Do you work on any projects related to question semantics?
  d. Do you have any experience with conference abstract writing?
  e. Do you have any experience with conference presentation?
  f. What do you hope to learn from this class?
  g. Do you have any concerns/questions?