The talk concerns *wh*-conditionals in Mandarin. It picks up a proposal discussed in Liu (2016): a *wh*-conditional involves a pair of questions. We offer a different implementation: *wh*-conditionals are treated as encoding a special dependency relation between two questions. To characterize the dependency, we consider a possible modification of Katturnen's semantics of question (Heim, 1994).

***Wh*-conditionals involve questions** A Mandarin *wh*-conditional (1) contains one (or more) *wh*-phrases in the antecedent clause matched by an equal number of co-varied *wh*s in the consequent.

(1) *M qing le shei, B (jiu) qing le shei.*
M invite ASP who, B (then) invite ASP who
'Bill invited whoever Mary invited.'

A puzzle posed by (1) is the consequent-*wh*. That Mandarin (non-interrogative) *wh*s are polarity sensitive items is well known (Cheng, 1997; Lin, 1996); yet it is unclear in what sense the second clause in (1) belongs to the class of polarity licensing environments — downward-entailing or modal in general.

Liu (2016) offers a solution. Instead of taking the *wh*s in (1) to be free variables and the entire construction to involve unselective binding (Cheng & Huang, 1996), he proposes that the conditional embeds questions in both its antecedent and its consequent. This explains the licensing puzzle. The *wh* words in these structures are not polarity items in need of licensing, nor are they relative pronouns Crain & Luo 2011 (as relative clauses in Mandarin do not involve *wh*-morphology to start with). They are simply question words. The two questions are then embedded under a situation-based semantics of conditionals (Heim 1990; Fine 2012) via answerhood operators (Dayal 1996; Beck & Rullmann 1999). Liu lists a wide range of interrogative properties of *wh*-conditionals to support his proposal.

We following Liu (2016) taking *wh*-conditionals as to involve questions. We however offer a different implementation: *wh*-conditionals are treated as encoding a special dependency between questions.

The significance of short answers For (1) to be true, the *short answers* of the two questions are felt to be identical (The two full answers are obviously not equivalent), suggesting the need to access the information about short answers of questions after questions are formed (cf. Xiang 2016). It is however unclear how to achieve this in the standard Hamblin/Karttunen framework where questions are sets of propositions and answers are propositional (sets of worlds) (Zimmermann, 1985). Specifically, it is unclear how to get from a set of worlds where John invited Jack and Sue to the individual $\mathsf{j}\oplus\mathsf{s}$.

Consider Zimmermann's argument (acknowledgements to be added). Take any property P (of type $\langle s,et\rangle$) and an arbitrary bijective function f of type $\langle e,e\rangle$. Form a new property P_f by putting: $P_f(w)(x) = 1$ iff $P(w)(f(x)) = 1$, for any individuals x and worlds w. If follows that the two properties P and P_f are distinct if f is not the identity function. However, for any such f, the corresponding questions *who has P?* and *who has* P_f*?* coincide, on the Hamblin-Karttunen account: since f is bijective, the propositions of the form *x has P* are the propositions of the form *x has* P_f. Thus the two underlying properties P and P_f cannot be distinguished and reconstructed from the question. The two short answers — $\sigma x.P(w)(x)$ and $\sigma x.P_f(w)(x)$ arguably — cannot be reconstructed either. Modification is needed.

Questions as sets of structured propositions As in (2), answers to questions are usually F-marked.

(2) Q_1: Who did Zhangsan invited? Q_2: Who invited Mary?
A_1: John invited Mary_F. A_2: #Zhangsan invited Mary_F.
A_1'#Zhangsan_F invited Mary. A_2': Zhangsan_F invited Mary.

We start with the semantics of the answers in (2) with F-markings. Instead of taking the meaning of 'Zs invited M_F' as consisting of an ordinary semantic value and a focus one (Rooth, 1992), we treat it as a *structured meaning* (von Stechow, 1990). A structured meaning of an expression with F-marking is a pair of meanings whose first element is the focus denotation and the second the denotation of the rest of the expression: $[\![\text{Zhangsan invited Mary}_F]\!] = \langle \mathsf{mary}, \lambda x\lambda w.\mathsf{z}\ \mathsf{invited}\ x\ \mathsf{at}\ w\rangle$

A question is a set of its possible answers (Hamblin, 1973). Since an answer denotes a structured meaning, a question denotes a set of structured meanings, in (3) (Heim 1994: 146). Question-Answer congruence now is just set membership. No separate Q-A constraint is needed (cf. Rooth 1992).

(3) $[\![\text{Who did Zhangsan invite?}]\!] = \left\{ \begin{array}{ll} \langle \mathsf{j}, & \lambda x\lambda w.\mathsf{z}\ \mathsf{invited}\ x\ \mathsf{at}\ \mathsf{w}\rangle, \\ \langle \mathsf{m}, & \lambda x\lambda w.\mathsf{z}\ \mathsf{invited}\ x\ \mathsf{at}\ \mathsf{w}\rangle, \\ \langle \mathsf{j}\oplus\mathsf{m}, & \lambda x\lambda w.\mathsf{z}\ \mathsf{invited}\ x\ \mathsf{at}\ \mathsf{w}\rangle \end{array} \right\}$

We also define *the* answer of a question at w, using Dayal's Ans, and how to *settle a question*.

(4) *Dayal-answer:* a possible answer of Q is a pair $\langle \mathsf{F},\mathsf{B}\rangle$ belonging to Q; the Dayal-answer at w is the unique $\langle \mathsf{F},\mathsf{B}\rangle$ being the strongest true answer at w.
$\mathsf{Ans}(Q)(w) = \iota\langle \mathsf{F},\mathsf{B}\rangle \in Q[(\mathsf{B})(\mathsf{F})(w) = 1 \wedge \forall\langle \mathsf{F}',\mathsf{B}'\rangle \in Q[(\mathsf{B}')(\mathsf{F}')(w) = 1 \rightarrow \mathsf{B}(\mathsf{F}) \subseteq \mathsf{B}'(\mathsf{F}')]]$

(5) *To settle a question:* an answer settles a question Q at w iff the $\langle \mathsf{F},\mathsf{B}\rangle$ is the Dayal-answer at w; it is a possible settlement of Q iff there is a world w such that $\langle \mathsf{F},\mathsf{B}\rangle$ is the Dayal-answer at w.

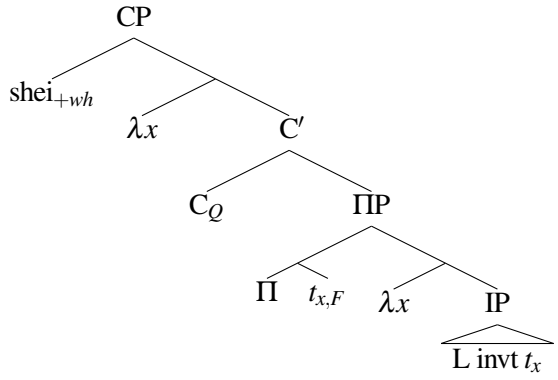
In general, since (i) the above semantics is a variant of the categorial/functional approach to questions, and (ii) the functional approach has more expressive power than the proposition-set approach (Krifka, 2001), notions that can be defined in the latter are also definable in the current semantics.

Finally, the semantics of questions proposed here is double access: the denotation of the short answer of a question can be directly read off its Dayal-answer, which is just the F-part of the latter. Zimmermann's argument does not apply either. The two questions discussed above *who has P?* and *who has P_f?* do not have the same denotation in this account (by having different B).

Crucially, the extra expressive power of accessing the short answer of a question is needed to provide an adequate semantics of Mandarin *wh*-conditionals. Before turning to *wh*-conditionals, we mention one argument for incorporating structured meanings into question semantics, concerning concealed questions (Barker, 2016). Concealed questions are syntactic DPs that can be interpreted as if they were questions. Crucially, not every DP makes good concealed questions. The basic generalization, according to Barker, is that only relational DPs such as *Mary's birthday*, *Bill's favorite drink*, *the capital of China*...— but not sortal DPs such as *the brick, Bill's rose* and *Bill* ...— can act as good concealed questions. To account for the paradigm, Barker proposes that questions are built out of focus-background structures $\langle \mathsf{F},\mathsf{B}\rangle$, and since relational DPs (but not sortal ones) provide such a structure — for example $[\![$Mary's birthday$]\!] = \langle \mathsf{day}, \mathsf{born\text{-}on(john)}\rangle$, they make good questions.

Question Composition The semantic composition below encodes two signatures of interrogative formation crosslinguistically: focus and indefiniteness of question words (Kiss, 1995; Haspelmath, 1997; Haida, 2008; AnderBois, 2012). The inspration comes from Karttunen (1977): an interrogative C_Q head forms a singleton set of propositions (or whatever declarative sentences denote) by Partee's IDENT basically, and an existential quantifier denoted by the question word quantifies in and enlarges the set.

(6)



a. $[\![\mathrm{IP}]\!] = \lambda w.\mathsf{ls\ invited}_w\, x$

b. $[\![\Pi]\!] = \lambda x\lambda P.\langle x,P\rangle$

c. $[\![\Pi\mathrm{P}]\!] = \langle x,\lambda x\lambda w.\mathsf{ls\,invited}_w\, x\rangle$

d. $[\![\mathrm{C}_Q]\!] = \lambda\pi'.\pi = \pi'$

e. $[\![\mathrm{C}']\!] = 1$ iff $\pi = \langle x,\lambda x\lambda w.\mathsf{ls\,invited}_w\, x\rangle$

f. $[\![shei]\!] = \lambda P\exists x[\mathsf{people}(x) \wedge P(x)]$

g. $[\![\mathrm{CP}]\!] = 1$ iff $\exists x[\mathsf{people}(x) \wedge \pi = \langle x,\ \lambda x\lambda w.\mathsf{Lisi\,invited}_w\, x\rangle] \xrightarrow{\lambda\text{-abstraction}}$

$\lambda\pi\exists x[\mathsf{peopl}(x) \wedge \pi = \langle x,\lambda x\lambda w.\mathsf{I\,invt}_w\, x\rangle]$
$= \left\{ \begin{array}{ll} \langle \mathsf{j}, & \lambda x\lambda w.\mathsf{I\ invited}_w\, x\rangle, \\ \langle \mathsf{m}, & \lambda x\lambda w.\mathsf{I\ invited}_w\, x\rangle, \\ \langle \mathsf{j}\oplus\mathsf{m}, & \lambda x\lambda w.\mathsf{I\ invited}_w\, x\rangle \end{array} \right\}$

Specifically, focus is responsible for structuring the meaning of a sentence radical (the IP) into a focus-background pair. In (6), Π is just a pair-forming operator, movement of the focus phrase to the complement of Π helps create the partition. Next, the focus phrase further moves to the Spec of the interrogative C_Q which turns $\langle \mathsf{F},\mathsf{B}\rangle$ into an identity statement, a classical proposition. The indefinite *shei* 'who' is then interpreted, existentially binding the individual variable in the F part of the $\langle \mathsf{F},\mathsf{B}\rangle$. Finally, λ-abstracting over the π variable (over $\langle F,B\rangle$) returns a set of structured meanings.

***Wh*-conditionals encode a special dependency relation** The antecedent and the consequent of a *wh*-conditional are questions, and the entire *wh*-conditional encodes a particular dependency relation between the two. Specifically, *wh*-conditionals have the semantics in (7), with c representing a Stalnakerian context set and $\mathsf{wh.match}$ specifying identity of the F-part of two answers.

(7) $[\![Q_A\ jiu\ Q_C]\!]$ is true at w in c iff $\forall w \in c : \mathsf{wh.match}(\mathsf{Ans}(Q_1)(w), \mathsf{Ans}(Q_2)(w))$, where two answer $\mathsf{wh.match}$ iff their F are identical.

Now it is clear why we need to treat questions as sets of $\langle \mathsf{F},\mathsf{B}\rangle$ pairs — it allows us to keep track of the F-part of a full answer, which corresponds to the short answer of the question, as *Mary* is to a question *who did Zhangsan invite?*. Then, two questions can stand in a certain relation because a particular relation holds between their short answers, precisely what a *wh*-conditional conveys.