Functional multiple *wh* free relatives

Andreea Nicolae (ZAS) – NELS 51, 6-8 November 2020, UQAM

Data of interest A garden variety free relative (FR) involves a *wh*-phrase construed simultaneously as an argument of both the matrix and of the embedded predicate. In this abstract I bring to light a new type of construction, a type of multiple free relative (MFR), involving two *wh*-phrases, each related to an argument of both the matrix and the embedded predicate. In the Romanian example in (1) the people eating are the same ones who brought the stuff that they are eating. These constructions are also quite common in Bulgarian (Rudin, 2008, Dimova, 2014), (2), but to date no semantic account has been offered that can account for their interpretation.

(1) A mâncat [cine ce a adus].
has eaten who what has brought.
'Everyone ate what they brought.'

(2) Studentite pročetoha [koj kakvoto beše napisal].
students read who what AUX written
'The students read what(ever) they had written.'

The goal of this abstract is to provide a compositional semantic account of these MFRs, the first of its kind. Note that these MFRs are not the same as those discussed by Caponigro and Fălăuş (2020), since in those constructions only the top *wh*-phrase satisfies an argument of the matrix predicate (typically the object).

(3) Bunica a împachetat [ce cui dă de Crăciun].
the.grandma has wrapped what who gives for Christmas
Roughly: 'Grandma wrapped the things she'll give to the appropriate people.'

The parallels with (functional) multiple *wh*-questions In multiple *wh*-questions replacing the higher *wh*-phrase with a universal quantifier will deliver the same interpretation as the multiple *wh*-question on a pair-list reading, (4a-b). The same is true in this case as shown by the fact that replacing the *wh*-phrase with a universal quantifier delivers the same interpretation ((1) vs (5)).

(4) a. Who ate what?
b. What did everyone eat?
c. Everyone ate what they brought.

(5) A mâncat fiecare ce a adus.
has eaten everyone what has brought
'Everyone ate what they brought.'

We can think of these MFRs as a possible way of answering a multiple *wh*-question like (4a), (pointed out by Dimova 2014); instead of listing the pairs of who and what they ate, we can respond with the function that is associated with those pairs, as in (4c). So these MFRs can be thought of as answers to multiple *wh*-questions just like FRs can answer single *wh*-questions.

(6) Q: What did Mary eat? A: Mary ate what she brought.

Note that there cannot be an overt subject or object in such constructions, reinforcing the observation above that each *wh*-phrase is somehow related to an argument of the matrix predicate.

(7) *Studenţii mănâncă cine ce a adus.
students.def eat who what has brought

(8) *Mănâncă cine ce a adus lapte.
eat who what has brought milk

Sketch of the analysis A common approach is to assume that single FRs denote the abstract of the corresponding *wh*-question, namely a set of individuals, $\langle e,t\rangle$. To derive this meaning, the *wh*-phrase is interpreted as a relative pronoun. A type shifter (akin to *the*) applies to this set returning the unique maximal member of the set (Jacobson, 1995, Caponigro, 2004).

By the same logic, the MFRs discussed here denote the abstract of the corresponding multiple *wh*-question, but crucially on its functional reading. This would mean that before the type-shifter applies, a functional MFR denotes a set of functions, $\langle\langle e,e\rangle,t\rangle$, as in (9): the set of function from people to things they brought.

(9) $[\![\text{who brought what}_{\text{MFR}}]\!] = \lambda f.\ [Range(f)=inanimate \wedge \forall x\ [human(x) \rightarrow x\ brought\ f(x)]]$

We have two tasks going forward: (I) what is the internal composition of functional MFRs? (II) how do functional MFRs compose with the rest of the clause?

Composing functional MFRs I propose that functional MFRs have the same underlying composition as multiple correlative constructions, discussed in Dayal 1996. For the internal composition, we can build on the analyses for the semantics of multiple *wh*-questions on their functional interpretation (Abels and Dayal 2017 and Xiang 2020). I assume an iterated C, such that

C_1 creates a set of propositions and C_2 acts as a $\cap$-closure (delivering the universal component).

(10) a. $[\![C_1]\!] = \lambda q_{\langle s,t\rangle}.\ p{=}q$ b. $[\![C_2]\!] = \lambda Q_{\langle st,t\rangle}.\ \cap Q$

Furthermore, I argue that *wh*-phrases come in 4 varieties: interrogative ($\exists$ quantifier) versus relative (domain restrictor) and individual- versus functional-denoting. With these tools under our belt, I propose the LF in (11) for a functional MFR, delivering the final meaning in (9). The object *wh*-phrase *what* moves to C2 where it is interpreted as a functional relative *wh*-phrase ($\langle eet, eet\rangle$), namely as a domain restrictor over sets of functions, leaving behind a functional trace, *f(x)*; this is necessary to derive the final interpretation of a set of functions. The subject *wh*-phrase *who* moves to C1 where it is interpreted as an individual-denoting interrogative *wh*-phrase ($\langle et, t\rangle$), leaving behind an *e*-type trace.

(11) $[_{eet}$ what$_{\langle eet,eet\rangle}$ $[_{eet}$ λf$_{\langle e,e\rangle}$ $[_{t}$C2 $[_{stt}$ λp$_{\langle s,t\rangle}$ $[_{t}$ who$_{\langle et,t\rangle}$ $[_{et}$ λx$_{e}$ $[_{t}$C1 $[_{st}$ x brought f(x)]]]]]]]]

Composing functional MFRs with the matrix predicate Since the MFR *who what brought* denotes a set (of functions), the type-shfter THE applies to it as in the case of single FRs.

(12) $[\![\text{THE}]\!] = \lambda F_{\langle ee,t\rangle}.\lambda G_{\langle ee,t\rangle}.\exists f_{\langle e,e\rangle}\ [(f{=}\imath g\ s.t.\ F(g)) \wedge G(f)]$

Applying THE to the MFR delivers a predicate of relations; specifically, it creates a set of relations built off the unique function that holds between individuals and the things they brought. The problem at this point is that the matrix predicate, a transitive verb, is of type $\langle e, \langle e,t\rangle\rangle$, which is of the wrong type to combine with the type-shifted MFR. In order to resolve this, I propose that predicates can also undergo type-shifting from a type $\langle e, \langle e,t\rangle\rangle$ denotation, (13a), to a functional $\langle\langle e,e\rangle, t\rangle$ denotation, (13b). On this denotation, a transitive verb like *eat* can be thought of as denoting a set of relations mapping individuals to things they ate.

(13) a. $[\![\text{eat}_{\langle e,et\rangle}]\!] = \lambda y.\ \lambda x.\ [x \text{ ate } y]$ b. $[\![\text{TSH}]\!]([\![\text{eat}_{\langle e,et\rangle}]\!]) = [\![\text{eat}_{\langle ee,t\rangle}]\!] = \lambda f.\ \forall x\ [x \text{ ate } f(x)]$

Putting all the pieces together, as in (14a), we derive the right interpretation in (14b): the unique function from people to things they brought such that for each individual in the domain of the function, that individual ate what (s)he brought.

(14) a. LF of (1): [[TSH eat] [THE [who what brought]]]

b. $[\![(1)]\!] = \exists f_{\langle e,e\rangle}\ [(f{=}\imath g\ s.t.\ Range(f){=}in \wedge \forall x[hum(x) \rightarrow x \text{ brought } g(x)]) \wedge \forall x\ [x \text{ ate } f(x)]]$

Adjunct MFRs At this stage, the story is more or less complete, with one caveat. While the TSH in (13b) can deliver the right interpretations for two-place predicates, we still need to understand what happens in the case of MFRs with 1 argument and 1 adjunct. Following Barros 2014 I will assume that even implicit non-argumental XPs are syntactically represented.

Conclusion and extensions This abstract provides the first compositional analysis of the interpretation of functional MFRs. It builds on the assumption that there are interrogative and relative *wh*-phrases, and that these can come in both individual and functional incarnations. Once this assumption is made, the composition proceeds seamlessly once couched within recent proposals for the internal composition of multiple *wh*-constructions. ⋆ Bulgarian MFRs can have both single pair and pair list readings; the suffix *-to* occurs on both *wh*-words in the single-pair version (15) but only on the second *wh*-word in the pair-list one (16). Note that bare *wh*-words are interrogative, while those suffixed with *-to* are relative pronouns. The present analysis can derive the difference in meaning between (15) and (16) compositionally.

(15) Koj-to kakvo-to iska, da go vzeme.
who-TO what-TO wants to it take
'Whoever wants something should take it.'

(16) Koj kakvo-to iska, da go vzeme.
who what-TO wants to it take
'Let each person take whatever they want.'

Bibliography ⋆ Abels&Dayal 2017. On the syntax of multiple sluicing and what it tells us about *wh* scope taking. ⋆ Barros 2014. Sluicing and identity in ellipsis. ⋆ Caponigro 2004. The semantic contribution of *wh*-words and type shifts. *SALT 14*. ⋆ Caponigro&Fălăuş 2020. Unveiling multiple *wh*-FRs and their functional *wh*-words. *S&P13*. ⋆ Dayal 1996. Locality in *Wh* Quantification. ⋆ Dimova 2014. A new look at multiple FRs: evidence from Bulgarian. ⋆ Jacobson 1995. On the quantificational force of English FRs. ⋆ Rudin 2008. Pair-list vs. single pair readings in multiple *wh* FRs and correlatives. ⋆ Xiang 2020. A hybrid categorial approach to question composition. *L&P*.