Assignment 1

Chris Potts, Ling 230b: Advanced semantics and pragmatics, Fall 2022

Distributed Sep 27; due Oct 11

1 Is it a type? [1 point]

For each of the following, say whether it is a type according to def. 1 from the 'Lambda calculi for semantic theories' handout.

i. s

ii. $\langle \sigma, \tau \rangle$

iii. $\langle t \rangle$

iv. $\langle t, \langle e, t \rangle \rangle$

v. $\langle e, \langle e, \langle e, \langle e, t \rangle \rangle \rangle \rangle$

vi. $\langle e, e, e, t \rangle$

vii. $\langle e, e \rangle$

viii. $\langle \langle e, t \rangle \rangle$

2 Interpretation [2 points]

Use def. 6 to calculate the meanings of the following relative to the $[\![\cdot]\!]$ defined in sec. 4 and the assignment function

$$g = \begin{bmatrix} x & \mapsto & \text{🤔} \\ y & \mapsto & \text{🙁} \\ z & \mapsto & \text{🙁} \end{bmatrix}$$

Please give a full breakdown of the recursive process. Here's an example:

$$\begin{aligned} & [\![(\textbf{student}\ x)]\!]^{\mathbf{M},g} \\ = & [\![\textbf{student}]\!]^{\mathbf{M},g}([\![x]\!]^{\mathbf{M},g}) \\ = & \|\textbf{student}\|^{\mathbf{M}}(g(x)) \\ = & \|\textbf{student}\|^{\mathbf{M}}(\text{🤔}) \\ = & \mathtt{T} \text{ if } \text{🤔} \in \{\text{🙁}, \text{🤔}\} \text{ else } \mathtt{F} \\ = & \mathtt{T} \end{aligned}$$

i. $[\![\textbf{kim}]\!]^{\mathbf{M},g}$

ii. $[\![(\textbf{student kim})]\!]^{\mathbf{M},g}$

iii. $[\![(\textbf{student}\ z)]\!]^{\mathbf{M}g[z \mapsto \text{😫}]}$

iv. $[\![(\textbf{student}\ x)]\!]^{\mathbf{M}g[z \mapsto \text{😫}]}$

3 Type theories [1 point]

For the following type definition, provide a succinct description of the set of types generated. This shouldn't take more than a few sentences. The more concise, the better, but the description needs to be an intuitive English one of the sort you would use in giving a lecture.

Definition 1 (PTQ; Montague 1973)**.** The smallest set $\mathit{Types}_{\mathbf{M}}$ such that

i. $e, t \in \mathit{Types}_{\mathbf{M}}$

ii. If $\sigma, \tau \in \mathit{Types}_{\mathbf{M}}$, then $\langle \sigma, \tau \rangle \in \mathit{Types}_{\mathbf{M}}$

iii. If $\sigma \in \mathit{Types}_{\mathbf{M}}$, then $\langle s, \sigma \rangle \in \mathit{Types}_{\mathbf{M}}$

4 Entailments [2 points]

i. Provide both scope representations for *Most unicorns love every student* using the fragment from the 'Lambda calculi for linguistic theories' handout.

ii. If there is an entailment relation between the two representations, say what it is, and try to convey why it holds. If there is no entailment relation between the two representations, then provide models that fully distinguish them.

5 Generalizing booleans [4 points]

i. Extend the fragment from the 'Lambda calculi for linguistic theories' handouts to include $\neg$ (negation; type $\langle t, t \rangle$), $\vee$ (disjunction; type $\langle t, \langle t, t \rangle\rangle$), and $\wedge$ (conjunction; $\langle t, \langle t, t \rangle\rangle$).

ii. Now define terms that allow us to use your boolean denotations on as wide a range of expressions as you can manage. Intuitively, you should be allowing for phrases like *student and unicorn*, *run and walk*, *believe or deny*, and *every or no*. Your terms should use meta-variables over types. You will need to define them recursively for the functions that are not in $\langle \sigma, t \rangle$.

6 Chutes and ladders [2 points]

Define a path around Partee's (1987) Diagram 1 that begins with an entity (type e) and leads you all the way back around to that entity again. Write down the semantics of the steps you take.

7 Definite and indefinite [1 point]

Show that Partee's (1987) **THE** and **a** differ by finding an argument for which they return different values. Articulate what the difference between the values is.

8 Predicative universals [2 points]

What is the status of $\mathbf{BE}\big(\mathbf{every}(\varphi)\big)$? Is it defined? If not, why not? If so, what values can it have?

References

Montague, Richard. 1973. The proper treatment of quantification in ordinary English. In Jaakko Hintikka, Julius Matthew Emil Moravcisk & Patrick Suppes (eds.), *Approaches to natural language*, 221–242. Dordrecht: D. Reidel. Reprinted in Montague (1974), 247–270.

Montague, Richard. 1974. *Formal philosophy: Selected papers of Richard Montague*. New Haven, CT: Yale University Press.

Partee, Barbara H. 1987. Noun phrase interpretation and type-shifting principles. In Jeroen Groenendijk, Dick de Jong & Martin Stokhof (eds.), *Studies in Discourse Representation Theory and the theory of generalized quantifiers*, 115–143. Dordrecht: Foris Publications. Reprinted in Portner & Partee (2002), 357–381.

Portner, Paul & Barbara H. Partee (eds.). 2002. *Formal semantics: The essential readings*. Oxford: Blackwell.