Assignment 9: Semantics – Jialu Wang

1. It would seem natural for postal codes conforming to your grammar to denote geographic regions, rather than the truth values denoted by Bach's logic fragment. What are some disadvantages to defining geographic regions as the referents of the postal codes? Would using truth values instead of regions solve any of these problems?

* Disadvantages

1. Over-simplified.

Areas are represented by one or two characters with many constraints such as "L" for Liverpool, "RH" for Redhill and "EH" for Edinburgh. It’s hard for users to understand the meaning behind the character and a chart is needed to illustrated the relationship between each area and its representing characters.

1. Inconsistency.

Some areas are represented by single characters while others by double characters.

Some districts are represented by single integer while others by double integers or integers followed by a character. Postcode lengths vary from 6 to 8 letters.

1. Notes-needed.

There are too many additional constraints in the notes. For example: The letters QVX are not used in the first position. The letters IJZ are not used in the second position.

The only letters to appear in the third position are ABCDEFGHJKPSTUW when the structure starts with A9A. The only letters to appear in the fourth position are ABEHMNPRVWXY when the structure starts with AA9A.

1. Some postcodes do not denote geographic regions such as BX1 1LT for Lloyds Bank formerly known as Lloyds TSB Bank– non-geographic address and BX2 1LB for Bank of Scotland (part of Lloyds Banking Group) – non-geographic address

* Can truth values solve the problems?

Truth values can solve the problem d by adding a truth value to decide whether a postcode denotes a geographic address but cannot solve problem a-c because it would be so complicated to represent an address only by true values.

1. Besides regions and truth values, what other kinds of entities could serve as some of the referents for elements of the postal code languages

* Organizations such as BS98 1TL for TV Licensing.
* Non-geographic address such as BX1 1LT for Lloyds Bank formerly known as Lloyds TSB Bank

1. Does the grammar as you expressed in the last assignment admit a compositional semantics? That is to say, if the meaning of a string should be based, in part, on the meaning of its component substrings, would you need to modify your grammar? Why or why not, and if so then how?

The grammar I expressed in the last assignment does admit a compositional semantics. For example: “::=” is used for definition,”<>” is used for specifying elements and “|” is user for “or” relationship. If we want to further incorporate constraints listed in the notes, further grammar can be added such as if and iff.

1. If an interpretation for this language consists of a denotation function and some kind of model structure, what should the model structure include? Compare your proposed model structure to Bach's M1 and M2.

The model structure should include:

E: set of individuals

{1, 0} : set of truth values

G: set of assignment of values to variables

D: A certain evaluation function.

BNF can already incorporate the grammar needed so we do not need to make distinction between world and times so the model should be more similar to Bach’s M1.

1. Choose any postal code constraint from the validation table or notes list that is \*not\* enforced by your grammar. Express that constraint in predicate logic. Specify a domain of discourse and provide a key to the predicate symbols, just as you did for the predicate logic assignment.

e.g. The letters QVX are not used in the first position.

Predicate logic: [domain of discourse: all uppercase characters, F for be the letter used in the first position]