A model theoretic and fully compositional treatment of floating quantifiers in Japanese is proposed employing a surface-based syntactic analysis. The present account not only overcomes a difficulty arising from the fact that a floating quantifier and its host are structurally independent of each other but is also capable of offering a principled account for scope ambiguity involving a floating quantifier and other quantificational elements.

1. INTRODUCTION

This paper demonstrates how to interpret Japanese sentences containing floating quantifiers from a model theoretic point of view (Montague (1974); Dowty, Wall, and Peters (1981) (DWP); Barwise and Cooper (1981) (B&C)). Some familiarity with the general framework of model theoretic semantics is presupposed. The relevant phenomena with which we will be concerned are exemplified by san-satu ‘three-Classifier(bound volume)’ in (1). The floating quantifiers in question are classificational as well as quantificational. In this paper we refer to them as ‘(floating) numeral classifiers’. Since numeral classifiers are optional, it is not necessary to include them to render the sentences in (1) well-formed.

(1) a. San-satu Hanako-ga (kinoo) hon -o
three-Cl(bound-volume) Hanako -Nom (yesterday) book -Acc
katta.
bought
‘Hanako bought three books (yesterday).’

b. Hanako-ga san-satu (kinoo) hon-o katta.
c. Hanako-ga hon-o (kinoo) san-satu katta.
d. Hanako-ga [NP san-satu-no hon]-o (kinoo) katta.

In (1a—c) the numeral classifier san-satu, construed with the direct object hon-o, is able to ‘float around’ to any pre-verbal position and be interspersed among other constituents. (1d) shows that numeral classifiers, being suffixed with the genitive marker -no, can be used NP-internally as well.
The paper is organized in the following manner. Section 2 introduces an explicit interpretation schema for sentences with floating numeral classifiers — the surface-based adverbial analysis proposed in Fukushima (1991b). This analysis adheres to the principle of compositionality, particularly the type-driven translation of Klein and Sag (1985) (K&S). That is to say that the proposed account takes advantage of an independently constructed syntactic structure and recursively calculates semantic types of larger constituents of the syntactic structure from the semantic types of their component constituents.

Next, the account given in section 2 is extended in section 3 to provide a principled treatment for scope ambiguity involving floating numeral classifiers and wh-quantifiers (e.g., *dare-mo* ‘everyone’). This is done by augmenting the system with the Quantification Calculus of Hendriks (1987). Given the surface-based approach, this move not only enables us to avoid employing additional unnecessary or unmotivated rules and devices for quantifier scope but also offers a simple solution for other phenomena involving type ambiguity. Thus this section provides further motivation for a synthesis between the type-driven translation of K&S and type ambiguity (Partee (1987); Partee and Rooth (1983)), both of which are indispensable tools of formal semantics but are apparently incompatible with each other.

Since we are mainly concerned with semantics, to make the exposition simple, we ignore word order variations in the language (or scrambling phenomena) involving numeral classifiers and focus only on cases like (1c) with a direct object ‘construee’ (or ‘host’) preceding a floating numeral classifier. Also excluded are construal patterns obtained (or not obtained) between floating numeral classifiers and subjects, indirect objects, and adjuncts. These construal patterns are distinct from the one with a direct object seen in (1a–c). See Fukushima (1991b) for a detailed account of floating numeral classifiers inclusive of scrambling. Fukushima (1991a) offers an account encompassing a wide range of Japanese floating quantifiers (including *zen-in* ‘all’, *hotondo* ‘most’, *takusan* ‘many’, etc.).

### 2. Syntax and Semantics of Floating Numeral Classifiers

#### 2.1. Syntax

This sub-section presents the syntax of floating numeral classifiers. A numeral classifier appearing outside of NPs (thus ‘floating’) as in (1a–c) is called a Direct object Oriented (numeral) Classifier (DOC) and given an