Notre Dame Journal of Formal Logic
Volume XVI, Number 4, October 1975
NDJFAM

THE PROGRAMMATIC SEMANTICS OF BINARY PREDICATOR CALCULI

JORGE BARALT-TORRIJOS, LUCIO CHIARAVIGLIO,
and WILLIAM GROSKY

One may take the view that combinatory logic is concerned with some families of calculi that share well studied morphological and transformational features. These calculi allow for a variety of interpretations. There has been some interest among those concerned with the theory of programming, in these calculi. The intuitive programming interpretations of some of these calculi generally view them as abstract theories of rules that govern problem solving by idealized computing facilities (see Goodman [2]). In this paper,* we wish to present a formal programmatic semantics for a selection of combinatory calculi that is based on first-order model theoretic considerations. There may be extensions of the methods here proposed to higher order and type theoretic considerations (see Curry, Hindley, and Seldin [1], and Sanchis [4, 5]). For the present, we shall limit ourselves to the first-order case.

In the following sections of the paper, we first review the morphology and transformational syntax of the calculi, we then construct a first-order referential semantics and conclude with a section that develops the programmatic semantics. The capstone of the paper is a semantic completeness theorem that exhibits how the semantic notion of programmatic equivalence is related to the syntactical concepts of reducibility and extensional equivalence.

1 *A family of first-order binary predicator languages* Each calculus **FC** of the family has the following morphology:

a) C is a set of *individual constants*;
b) V is a denumerably infinite set of *individual variables*;
c) $\equiv$ is a two-place predicator;
d) ap is a two-place functional sign;

*This work was supported in part by National Science Foundation Grant GN-655.

Received June 5, 1974