

THREE-VALUED FREE TENSE LOGIC

ROBERT P. McARTHUR

1 *Introduction* In [11] Strawson suggested that sentences containing singular terms, i.e., proper names or definite descriptions, may be true at one time, false at another, and unvalued (neither true nor false) at a third due to a failure of reference. Both Van Fraassen [12] and Woodruff [13] have supplied semantic interpretations of standard quantificational logics which embody Strawson's theory. In this paper, we extend their results to a quantificational version of the tense logic K_t .¹ Our semantics reflects the fact that in temporal contexts there are several ways a singular term may fail to refer. For example, both of the sentences

- (1) The King of France is wise.
- (2) Sherlock Holmes lives on Baker Street.

are (now) unvalued, whereas of

- (3) The King of France was wise.
- (4) Sherlock Holmes lived on Baker Street.

only the last is. Furthermore, taking issue with a point of Ryle's,² if "Junior" (timelessly) is the name of my yet unborn son, then the first *but not the second* of the following

- (5) Junior (now) goes to school.
- (6) Junior will go to school.

is unvalued. The point here is that the singular terms which do and do not refer may vary from time to time.

2 *Syntactical Preliminaries* Among the signs of QK_t^* are the usual denumerable infinities of sentence parameters, m -adic predicate parameters, individual variables, and individual parameters (doing duty for singular terms), plus the connectives ' \sim ' and ' \supset ', parentheses, the quantifier letter ' \forall ', and the tense operators '**F**' (read, "It will be the case that") and '**P**' (read, "It has been the case that"). Two additional operators are defined in terms of **F** and **P**, '**G**' (read, "It will always be the case