1. Possible worlds.

My initial intuitions are those of Tichý [4]; i.e., I suppose we have at our disposal a set of mutually independent empirical tests; the results of their applications to the \( n \)-tuples \( (n \geq 0) \) of the members of the universe of discourse \( U \) cannot be known in advance; therefore, any total sequence of possible results of the tests determines a possible world. Having actually applied all the tests we get such results as determine the designated possible world, the actual world. I use the letter \( W \) to denote the set of possible worlds.

In a sense, the above construction is independent of a language, but as soon as we take into account a language (given by its syntactical basis, by \( U \) and by some sort of intensional entities) the situation will change. Studying possible worlds with respect to a language \( \mathcal{L} \) means choosing a subset of the "absolute" set of tests, i.e. a subset such as contains only those tests which the language \( \mathcal{L} \) "has at its disposal". Now I shall describe the method of this choice.

We suppose that the language \( \mathcal{L} \) contains (a finite number of) names of some mutually independent elementary concepts. As we consider any concept to be a function from the given set of possible worlds to the set of some entities, we employ Tichý's modification [3] of Church's system of the simple theory of types [1]. In other words, we regard our language \( \mathcal{L} \) as an \( \mathcal{L}_\mu \)-language [3]. Any constant of an \( \mathcal{L}_\mu \)-language is of a type that is constructed from the lowest-level types \( o \) (truth-values, say \( t \) — truth, \( f \) — falsehood), \( t \) (individuals) and \( \mu \) (possible worlds) according to Church's principles. In any \( \mathcal{L}_\mu \)-language there are variables of various types. Any constant of type \((a\beta)\) \(^1\) denotes a function mapping the set of entities of type \( \beta \) into the set of entities of type \( a \). Any logical constant has a certain type of its own (e.g. binary connectives are of type \( ooo \)). Where \( A \) is of type \( a\beta \) and \( B \) of type \( \beta \) the expression \( AB \) is of type \( a \) and denotes the value of the function denoted by \( A \) on the argument denoted by \( B \).

**Definition 1** Where \( b \) is a variable of type \( \beta \) and \( A \) is an expression of type \( a \), the expression \( abA \) denotes the function of type \( a\beta \) that assigns any entity \( v \) of type \( \beta \) the value taken by \( A \) when \( b \) takes the value \( v \).

The \( \mathcal{L}_\mu \)-languages mutually differ in their choice of extra-logical constants. As for \( U \), we shall consider it to be constant for any \( \mathcal{L}_\mu \)-language, but we shall analyze various cases of applying \( \mathcal{L} \) to subsets of \( U \). Such restrictions of the \( \mathcal{L} \)-

\(^1\) As for parentheses, we write \( a\beta \gamma \delta \ldots \) instead of \( (((a\beta)\gamma)\delta) \ldots \)
application will not mean that the \( L_\mu \)-language in question does not remain the same for any such restriction.

Now, let \( L \) be an \( L_\mu \)-language. Let its "\( U \)-restrictions" be non-empty finite sets \( U_1, U_2, \ldots \). Finally, let the syntactical basis of \( L \) contain finite number of extra-logical constants denoting mutually independent elementary concepts.\(^2\)

**Definition 2** Given \( L \) and \( U_i \), the set \( W[L, U_i] \) (of "selected" possible worlds with respect to \( L \) and \( U_i \)) can be constructed as follows: We construct a table where the most-upper row consists of the extra-logical constants of \( L \) the type of which ends in \( \mu \). On the basis of the type of any constant on the one hand and \( U_i \) on the other, we find out the number \( m \) of possible values of the function denoted by the constant in question. If the constant in question names a function from possible worlds to set-theoretical objects (individuals, classes, relations-in-extension) we get \( m = \) the cardinal number of the set of the relevant set-theoretical objects. If the function named by the constant in question takes possible worlds to concepts or to functions from \( g \) to \( h \) where at least one component of \( g \) or \( h \) is a concept, we take into account only such concepts that have their names in \( L \). We put down these possible values into the column under the first constant. Having made the analogous computation for the following constant and having obtained a number \( n \) we multiply the outcome by the preceding outcome. Thus we get the number of possible combinations of the possible values of both the functions. We expand the first column so that it contains \( n \)-times the first result. The number of rows that contain values of functions makes now \( m \cdot n \). We put down the second column repeating any value in the usual way so as to exhaust all combinations. So we go on until the last column is filled up. Our table can be conceived as the table of the members of \( W[L, U_i] \): every member of \( W[L, U_i] \) is given by one row of values in our table.

We repeat that the set \( W[L, U_i] \) is not identical with the set of possible worlds: it is only a subset of it.

It is clear that the process of computing the values of the functions denoted by the constants of \( L \) is effective for any \( U_i \). We can say, therefore, that the function which takes the pairs \( \langle L, U_i \rangle \) to the cardinal numbers of \( W[L, U_i] \) is effectively computable.

For example\(^3\), let \( L \) contain \( a_0 \) constants of type \( \mu \) (denoting individual concepts), \( a_1, \ldots, a_k \) constants of type \( o\mu, \ldots, o\mu^k \mu \), respectively (denoting properties and relations-in-intension), \( b \) constants of type \( \iota(o\mu) \mu \) (this sort of constants corresponds approximately to demonstrative and possessive pronouns), \( c \) constants of type \( o\mu(o\mu) \mu \) (these constants have something in common with adjectives and

\(^2\) From now on, this is what is meant by "Language \( L \) contains constants ...".

\(^3\) I have chosen a language whose constants are of such types that will remind us of some grammatical categories of a natural language.