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Preface

The model-theoretic paradigm of the truth and falsity of sentences under various interpretations of the language emerged in mathematics in the nineteenth century; it carried the day in logic since the first half of the twentieth century; and it gained a foothold in the philosophy of science during the second half of the twentieth century.

In the nineteenth century mathematicians realised that terms they were using in geometry and algebra allowed *multiple interpretations* – and "abstract" mathematics was born. "Straight line" could be interpreted as "large circle on a sphere", and the operation "plus" could be applied not only to various types of number, but also to quaternions, functions, vectors, and matrices. Boole even created a calculus which could be interpreted in terms of propositions, sets, or probabilities.

In spite of nineteenth century mathematics and Boole's work in logic, the early twentieth century saw Russell and the early Wittgenstein inherit from Frege and Peano a mature system of formal logic which was implicitly assumed to be about "the" unique universe of mathematical (especially numerical and set-theoretical) and physical objects. Well-formed sentences were supposed to have meaning to the extent that they report on facts or beliefs about this universe. In this *logical atomist* paradigm – to boldly oversimplify – there was assumed to be just one way to assign denotations to the vocabulary of the language and hence meaning to the sentences. (Belatedly, Saul Kripke's "rigid designators" in *Naming and Necessity* are a relic of this era.)

Logical atomism and the picture theory of meaning did not long survive the rise of *model theory* following Tarski's publications on truth and logical consequence. Truth came to be seen in terms of a relation of satisfaction between a sentence and a particular interpretation of the language. An interpretation is a set-theoretic structure, and the relation of *satisfaction*, determining the assignment of truth values to sentences, is established by freely specifying the denotations of terms and predicate symbols in the domain of the interpretation. Henceforth saying "sentence *s* is true" can only be elliptic for "sentence *s* is true under the following interpretation *I*: ...". This holds also for sentences in natural language, where *I* is often implicitly provided by pointing, by context, by convention (e.g. the dictionary meaning of a word), etc.

During the second half of the twentieth century some philosophers of science reacted negatively to the new model-theoretic paradigm, some by simply ignoring it, some by considering it irrelevant to the philosophy of empirical science, and some by trivializing it. A prime example of the latter reaction was that by Quine: "Attribution of truth to 'Snow is white' just cancels the quotation marks and says that snow is white. Truth is disquotation." ("Truth" in *Quiddities*.) Note how in "attribution of truth..." the crucial Tarskian, or model-theoretic, "under interpretation *I*" has gone missing. If it were present (say e.g. $I(\text{"snow"}) = \text{cocaine}$, etc.), then Quine's claim would collapse to nonsense.

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