Chapter 2 focused on the ontological puzzles raised by theoretical modelling. We will now turn to the problem of scientific representation. First, we will see how the make-believe view may be used to offer an account of representation which meets the criteria set out in Chapter 1 (Section 3.1). This account will draw a parallel between scientific models and works of fiction. In Section 3.2, we will pause to consider some objections to this comparison. Finally, in Section 3.3, we will focus on a type of model that presents problems for theories of scientific representation. These are models which represent no actual, concrete object. As we will see, unlike existing accounts, the make-believe view is able to make sense of these models.

3.1 Make-believe and model-representation

3.1.1 The account

In Chapter 2, I proposed that we understand scientific models as representations, in Walton’s sense. Models, I argued, function as props in games of make-believe. In physical modelling, the prop is a physical object, such as the architect’s scale model of the bridge. In theoretical modelling, like our model of the bouncing spring, the prop is usually a prepared description and set of equations. In some cases, the prop might be a diagram or picture. Just as for novels or paintings, the principles of generation governing the games in which these props function are complex and vary from case to case. In each
case, however, the model represents in virtue of prescribing imaginings. We may formulate this account as follows:

**MM:** *M* is a model-representation if and only if *M* functions as a prop in a game of make-believe.

In saying that *M* ‘functions’ as a prop, I mean that it is the social function of *M* to be used in this way, within the relevant community of model-users. As we have seen, something is an object of a representation, in Walton’s theory, if the representation prescribes imaginings about it. According to **MM**, then, a model *M* will represent a target system *T* if *M* prescribes imaginings about *T* within a game of make-believe. Notice, however, that according to **MM**, it is not a necessary condition for model-representation that the model prescribes imaginings about any target system *T*. We shall see the importance of this feature of the account in Section 3.3.

In Chapter 1, we coined the term ‘model-representation’ for the form of representation scientific models employ. We noted that there might be many different forms of model-representation and that each of these forms of model-representation might not be unique to scientific models. An account of representation for scientific models should provide us with conditions that are both individually necessary and jointly sufficient to establish an instance of each form of model-representation that we identify. **MM** is intended to provide an analysis of model-representation. Tentatively, I suggest that the analysis it provides applies to all cases of physical and theoretical modelling. As we have seen, Walton argues that his theory applies to novels, paintings, plays and films. If he is correct, then according to **MM**, model-representation turns out not to be unique to scientific models, but an instance of a much wider form of representation also found in works of fiction. Since some will object to this comparison, we will consider the relationship between models and works of fiction in more detail in Section 3.2.

In the terminology I introduced in Chapter 1, **MM** is a *derivative* account of model-representation: it aims to show how the representational power of scientific models derives from the representational power of certain mental states, namely those of the imagination. The account claims that scientific models represent in virtue of the acts of imagination they prescribe. When a model represents an actual