1

Examples and Preliminaries

We begin with an example from everyday life, which will serve as a vehicle for an informal introduction to the main concepts of media theory. Several other examples follow, chosen for the sake of diversity, after which we briefly review some standard mathematical concepts and notation. The chapter ends with a short historical notice and the related bibliography. Our purpose here is to motivate the developments and to build up the reader's intuition, in preparation for the more technical material to follow.

1.1 A Jigsaw Puzzle

1.1.1 Gauss in Old Age. Figure 1.1(a) shows a familiar type of jigsaw puzzle, made from a portrait of Carl Friedrich Gauss in his old age. We call a *state* of this puzzle any partial solution, formed by a linked subset of the puzzle pieces in their correct positions. Four such states are displayed in Figure 1.1(a), (b), (c) and (d). Thus, the completed puzzle is a state. We also regard as states the initial situation (the empty board), and any single piece appropriately placed on the board. A careful count gives us 41 states (see Figure 1.1.2). To each of the six pieces of the puzzle correspond exactly two *transformations* which consist in placing or removing a piece. In the first case, a piece is placed either on an empty board, or so that it can be linked to some pieces already on the board. In the second case, the piece is already on the board and removing it either leaves the board empty or does not disconnect the remaining pieces. By convention, these two types of transformations apply artificially to all the states in the sense that placing a piece already on the board or removing a piece that is not on the board leaves the state unchanged.

This is our first example of a 'medium', a concept based on a pair $(\mathcal{S}, \mathcal{T})$ of sets: a set $\mathcal{S}$ states, and a collection $\mathcal{T}$ of transformations capable, in some cases, of converting a state into a different one. The formal definition of such a structure relies on two constraining axioms (see Definition 2.2.1).

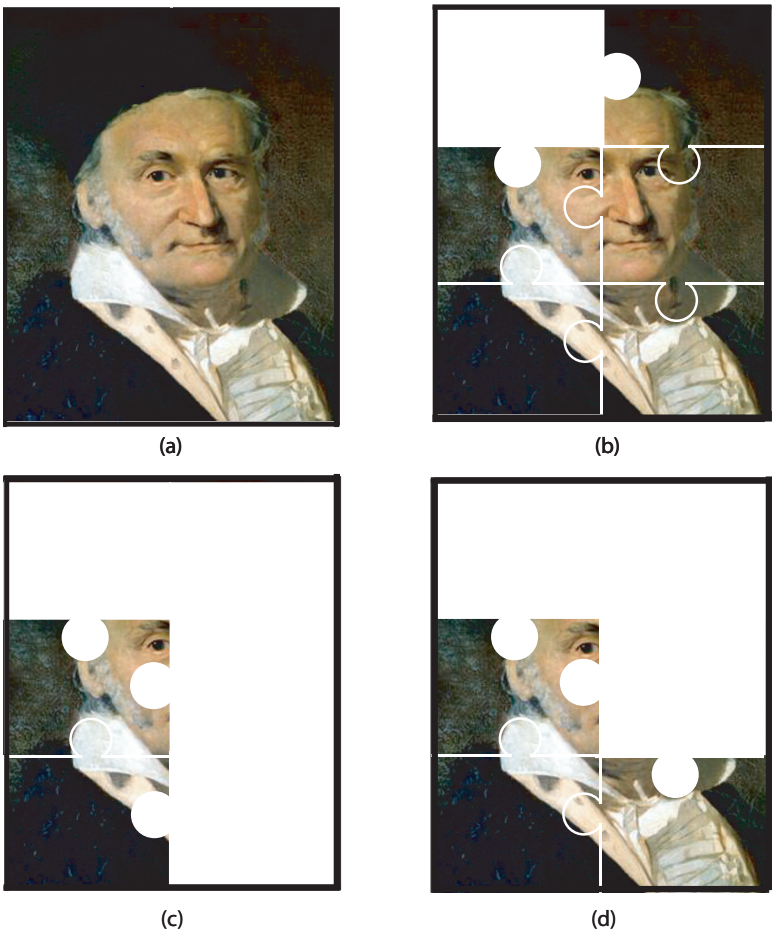

Figure 1.1. Four states of a medium represented by the jigsaw puzzle: Carl Friedrich Gauss in old age. The full medium contains 41 states (see Figure 1.2).

By design, none of these transformations is one-to-one. For instance, applying the transformation "adding the upper left piece of the puzzle"—the left part of Gauss's hat and forehead—to either of the states pictured in Figure 1.1(c) or (d) results in the same state, namely (a). In the first case, we have thus a loop. Accordingly, the two transformations associated with each piece are not mutual inverses. However, each of the transformations in a pair can undo the action of the other. We shall say that these transformations are 'reverses' of one another. For a formal definition of 'reverse' in the general case, see 2.1.1.

1.1.2 The Graph of Gauss's Puzzle. When the number of states is finite, it may be convenient to represent a medium by its graph and we shall often do so. The medium of Gauss's puzzle has its graph represented in Figure 1.2 below. As usual, we omit loops.

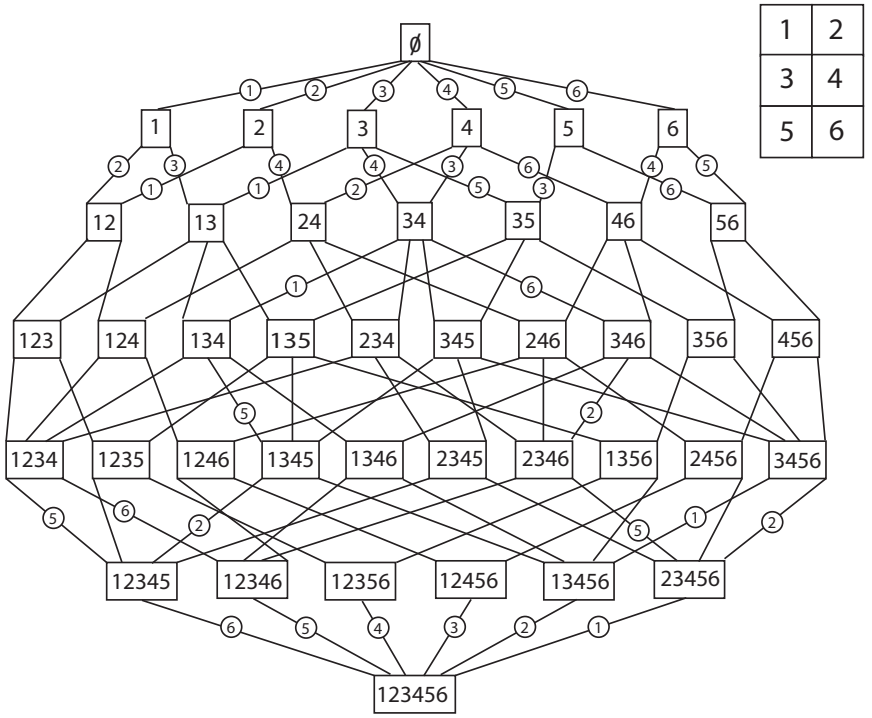

Figure 1.2. Graph of the Gauss puzzle medium. A schematic of the puzzle is a the upper right of the graph, with the six pieces numbered 1,. . . , 6. Each of the 41 vertices of the graph represent one state of the medium, that is, one partial solution of the puzzle symbolized by a rectangle containing the list of its pieces. Each edge represents a pair of mutually reverse transformations, one adding a piece, and the other removing it. To avoid cluttering the figure, only some of the edges are labeled (by a circle).

An examination of this graph leads to further insight. For any two states S and T, it is possible to find a sequence of transformations whose successive applications from S results in forming T. This 'path' from S to T never strays from the allowed set of states, and can be made minimally short, that is: its length is equal to the number of pieces which are not common to both states. Moreover, any two such paths from S to T will involve exactly the