■ Exercise 3.13

Select one of the folders on your laptop which contains at least three levels and draw a hyperbolic browser representation. Comment on benefits it may or may not offer when seeking an item which is a leaf node.

■ Exercise 3.14

For a local shop, department store, book collection, recipe collection or photo collection, draw a tree descriptive of the contents, but stop at the third level. From this data generate a tree map. Comment on any difficulties you encounter.

CHAPTER 4

Presentation

A problem

Many of us have found ourselves with a report that has to be completed by a deadline, with the result (Figure 4.1) that the dining room table, extended to its 12-guest state, is covered in piles of paper as well as reports, books, clippings and even old slides, perhaps with more arranged on the floor and a couple of chairs. There may even be piles on top of piles. Such a presentation of vital information makes a lot of sense: everything relevant is to hand (we hope!), its visibility acts as a reminder (Bolt, 1984; Malone, 1983), and spatial memory (Czerwinski *et al.*, 1999) reminds us where we put something. Indeed, with so much on view, ideas may emerge opportunistically. In this environment I can concentrate on creative tasks rather than on organization, at which I do not excel.

FIGURE 4.1
Support for report preparation. Many sources of content are visible and ready to hand

Despite the availability of high-resolution displays and powerful workstations, I still draft most of my reports this way. Why? Not because of any Luddite tendency, but because the display area provided by typical workstations is far too small to support, visibly, all the sources that are relevant to my composition.

I am not alone in having too much data and too small a screen. A very large and expensive screen, for example, would be needed to display, in full detail, the London Underground map or the organization tree of a large company. And the problem is worse if only a PDA or a mobile is available: standing in a London street, with no map in sight, how can I effectively view the London Underground map in order to plan a journey?

The presentation issue

We identified the problems of inadequate screen real estate in Chapter 2 under the generic heading of '**Presentation**', for which it is now appropriate to offer a definition. Reference to a dictionary provides, among a number of definitions,

present (tr.v): *to offer to view; display.*

Thus, irrespective of how data may be *represented*, a decision has to be made about how that representation is to be *displayed* – to be offered for view by a user – and even *whether* it is to be displayed. Necessarily, in view of limited display area, the issue of layout arises. Also, there will inevitably be an interdependence between representation and presentation. Even if represented data is chosen to be displayed there remains the question as to whether its display should be under interactive control. Such decisions are, of course, heavily influenced by the task that a visualization tool is designed to support. There is a pressing need for an understanding of the problems involved in presentation and related concepts that will correspondingly inform interaction design.

4.1 Space limitations

4.1.1 Scrolling

An obvious solution to the problem posed by a document that is larger than the display area is that of scrolling, in which a long document can be moved past a 'window' until something relevant is noticed (Figure 4.2). Sometimes this is a satisfactory approach but in many cases it is not. For example, I'm composing Chapter 2, working on Section 2.3 (I think – I can't see the last section heading) and I want to remind myself of a figure placed in the previous section. Where is it? I must scroll – but to where? Tedious and often time-consuming search may be needed during which memory for current tasks begins to fade, leading to the 'Now, where was I?' problem exacerbated by the need to scroll back to where I was. Users of microfilm readers will readily recognize this scenario. The main problem with scrolling is that most content is *hidden from view*.

FIGURE 4.2
Scrolling hides most of a document
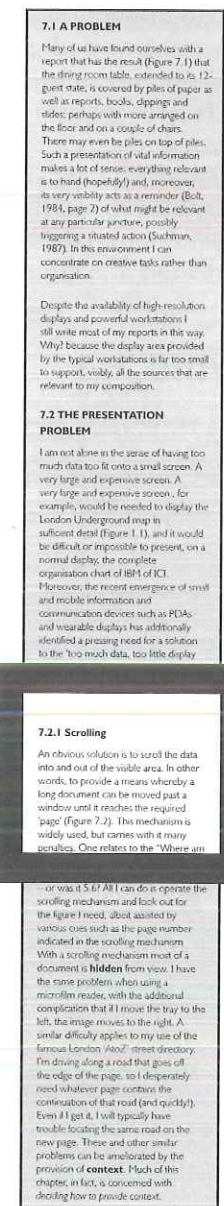
4.1.2 Overview+detail

One disadvantage of scrolling – that one cannot have a view of context as well as detail – can be overcome by presenting views of both. But usually there is not enough space to achieve this in a *linear* fashion, with context presented at the same resolution as detail. Instead, and with greater benefit, two separate views, one of detail and the other of context, can be designed to present what is termed an *overview+detail* view. A familiar example (Figure 4.3) is the facility to see an overview comprising miniature pages of a document ranged vertically alongside one particular page from which detail is discernible. The user is afforded the

FIGURE 4.3
Overview+
detail.
Miniatures of
pages of a pdf
document
provide useful
context while
attention is paid
to detail of one
page
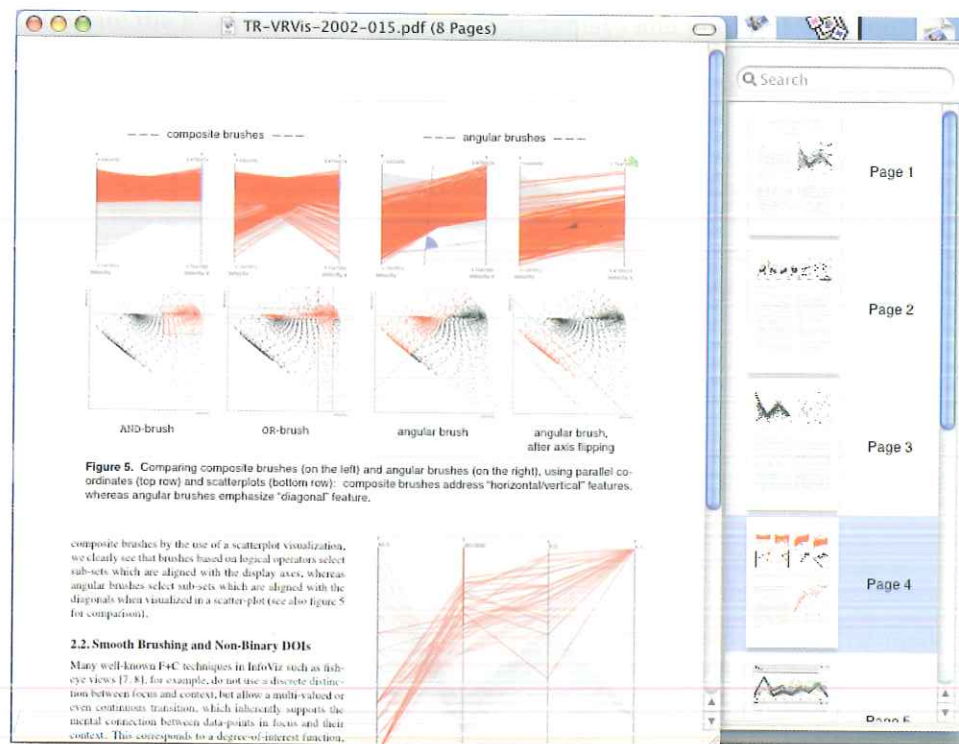
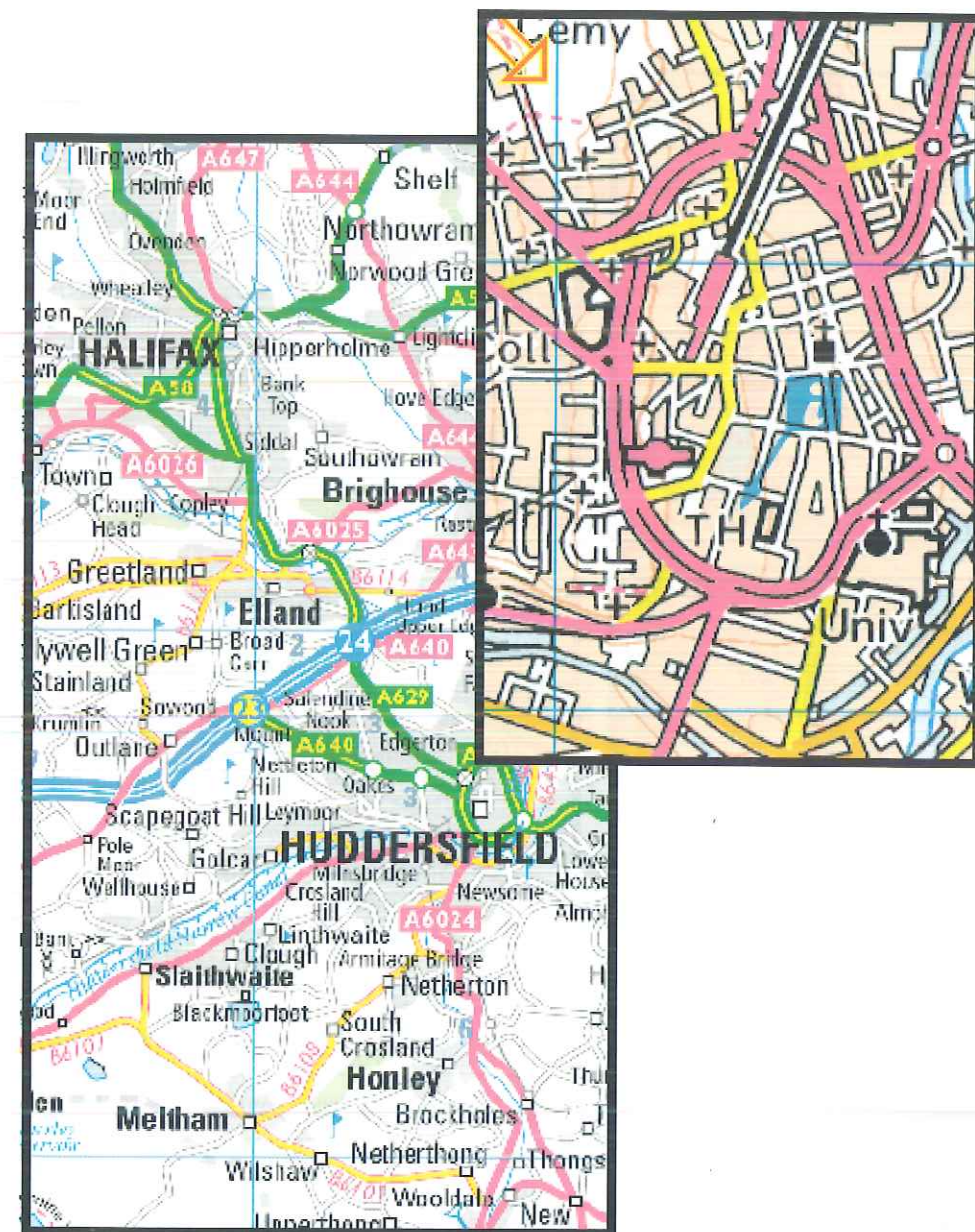

FIGURE 4.4
Use of a video
editing suite is
supported by the
presentation of
overview+detail.
Eight available
video clips (at
top) provide an
overview of
available material;
the one currently
in use is
highlighted.
Lower left shows
an overview
representation of
the portion of the
complete video
being edited,
while the image
at right provides
detail of the
image associated
with the selected
moment in the
time domain
Source: *Courtesy of
Colin Grimshaw*
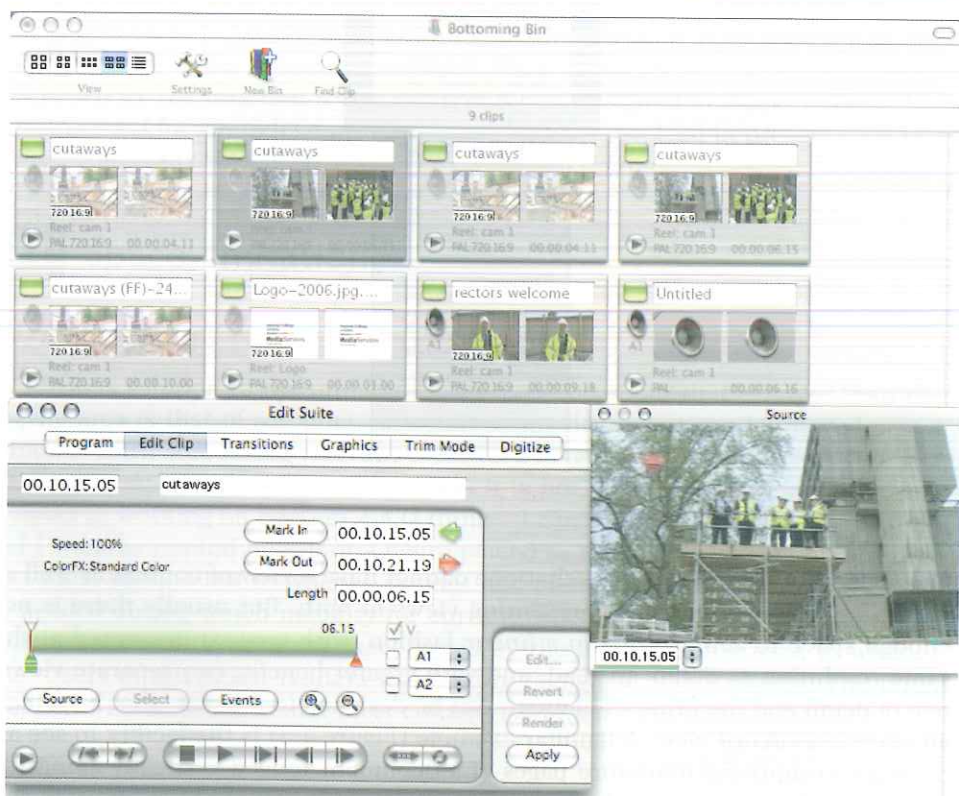
opportunity, at their own pace and discretion, to drill down into detail but retain
an awareness of context, iterating their attention easily between the two views.
The highlighted miniature provides a 'you are here' sign. Another example is
provided by a video editing suite (Figure 4.4) which presents the editor with a
reminder of the context of the few seconds that are currently subject to careful
and detailed attention. Overview+detail separates content into comprehensible
pieces, at the same time clarifying their interrelationships.

The concurrent need for overview and detail is frequently present during
travel, particularly by car. For example, a person from the South of England is

FIGURE 4.5
A journey north
towards Halifax
requires detail
of the town
(Huddersfield)
through which
the traveller
passes

travelling north to visit his Aunt Mabel in Halifax and, on the way, must travel through Huddersfield. Negotiating the streets of Huddersfield is no mean achievement and requires a detailed map, but he must not lose sight of the overall purpose of the journey, which is to reach Halifax. For this reason the (typically stressed) human navigator is usually to be found clutching two paper-based maps, one of detail and the other providing an overview (Figure 4.5). Possible improvements include a real or simulated magnifying glass (Figure 4.6) and the DragMag (Ware and Lewis, 1995) in which a small region of interest within the context map can be flexibly positioned to provide a magnified view, often with added detail (Figure 4.7). While DragMag avoids the drawback of masking inherently present with the real or simulated magnifying glass, both of
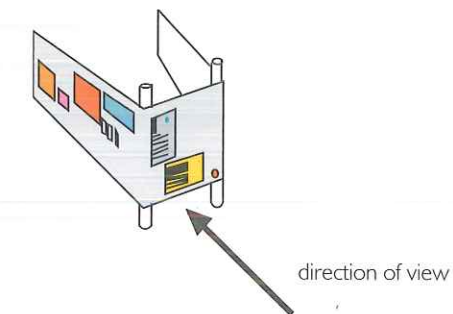
these presentations have the same drawback as two separate maps, a drawback which, in fact, is immediately apparent to the navigator who is trying to guide the driver through the streets of Huddersfield on to the main highway going north to Halifax. The drawback is typically articulated by the question, 'Does the High Street or Market Street take us to the main highway north?' What is missing is the *connection* between the detail and overview presentations. What the navigator needs is some presentation in which a road in the detailed map flows smoothly into a road in the context map. This need, which is extremely general and not confined to maps, is referred to as the *focus+context* problem, a solution to which is now presented.

4.1.3 Distortion

The technique called *distortion*, first suggested in 1980, offers a way of solving the focus+context problem. The bifocal display (Imperial College Television Studio, 1980; Spence and Apperley, 1982) is based on the very simple metaphor illustrated in Figure 4.8. An information space in the form of a long strip of paper (a) too large to be viewed in detail within a normal display area is wrapped around two uprights (b) in such a way that, when viewed from an appropriate direction, part of that space can be viewed in detail while a 'bird's eye view' is provided of the remainder (c). Thus, in the digital embodiment of

FIGURE 4.6
The use of a real or digitally simulated magnifying glass masks detail around the magnified region

FIGURE 4.7
The DragMag technique allows flexible positioning of the region to be magnified

FIGURE 4.8
Metaphor illustrating the principle of the bifocal display

(a) An information space containing documents, emails, etc.

direction of view

(b) The same space wrapped around two uprights

(c) Appearance of the information space when viewed from an appropriate direction