# Moving Tables from Paper to CRT Screen

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This paper develops the notion of "layers" of information within a table, and discusses how such layers are typographically distinguished on paper and in a viewdata system (Prestel). A case history is presented of the difficulties facing a British government department wishing to communicate frequently updated tabular information to the agricultural community. Several approaches to design solutions are discussed in terms of the adequacy with which they handle the different layers of information within the table. This leads to a formulation of the kinds of questions which designers need to consider when transferring information from print to CRT screen.

In the last decade or so a significant change has taken place in the way we receive information. The advent of computers into the office and the home means that many of us now process some of the information that we need from a CRT screen rather than from paper. This article examines the ways in which tabular information can be structured and displayed in one of the new computer-based media and contrasts this with the way such information was previously presented in the medium of print. Examples of materials used in this article are taken from a case-study carried out as part of a British Library funded project, Graphic Translatability of Text, which is being undertaken in the Typography Department at the University of Reading.

Prestel is the name given by British Telecom to its version of the kind of information system known generically as viewdata. Such systems typically use a computer to store information, the telephone to trasmit it, and a TV screen to display it. Although originally seen as a home television information service, Prestel has found most of its users among specialist groups such as commodity houses in the City of London and travel agents . Some smaller specialist groups have been experimenting with the medium. Included among these is the Ministry of Agriculture Fisheries and Food (MAFF) whose material forms the subject of the case-study which will be discussed in detail later. These groups all benefit from Prestel's facility for constant and rapid updating.

When asked why people might change to computer-based media, with a



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screen rather than a printout as the form in which the information is presented, one is tempted to answer "because it is there". While this may be part of the truth, the main features which people find important for choosing such a system are listed below under the heading "Shortcomings of printed media". This list is adapted from Maslin (1983).

**Advantages of printed media.** They are: portable, copyable, annotatable, of high resolution, scannable (the reader can leaf through them), browsable (the reader can read at random in them).

**Shortcomings of printed media.** They are not: up to the minute, customised, delivered on demand, able to provide several levels of detail on a topic.

To Maslin's list can be added the fact that printing is becoming increasingly expensive and is, on the whole, slow to produce. Any information which changes rapidly may be out of date by the time it is printed. The telephone directory is a good example; its production cannot keep up with the changing telephone numbers of individuals and businesses. In France, PTT have been experimenting with a viewdata system in an attempt to combat this problem (McLaren, 1983).

In the case of MAFF (specifically the Agricultural Development and Advisory Service, ADAS) much of the information provided for farmers is of the "up to the minute variety". However, they also provide material that has a longer life. As Houseman (1983) states, "There is merit in providing material that is less perishable and time critical than, say, commodity information, perhaps on a seasonal basis. Crop variety information is a good example because of the benefits that accrue to the publishing organisation (extension service) rather than the user/farmer." The tables to be discussed here provide information of this "less perishable" kind.

There are considerable differences in the capability and flexibility of printed media and viewdata systems. These differences affect the way information can be displayed and structured. Figure 1 lists those features which relate to the graphic and spatial qualities of each medium.

Not only do the media differ in their graphic and spatial qualities, but there are also differences in the skills of the media manipulators and in the body of expertise on which they can draw. In print the conventions for displaying and organising tabular matter, making use of the features listed in Figure 1, are well established. On the whole these conventions are known and understood both by information providers and by users. Production and design is carried out by people trained in the long traditions of a craft industry. For those putting information onto Prestel no such conventions exist. Training in the use of the system is usually rudimentary and there is very little written guidance to back it up. Trial and error is the order of the day.

By a process that I shall call "layering", complex tabular arrangements permit a large amount of information to be displayed to the reader at one time.

| Print | Prestel |
|---|---|
| *Graphic Features* | *Graphic Features* |
| * choice of typefaces | * one typeface provided by manufacturer |
| * choice of typesizes | * single and double height characters only |
| * choice of type variants (e.g., roman, italic, bold) | * one type variant — roman |
| * large character set | * character set comparable with typewriter |
| * characters vary in width | * single width characters |
| *Spatial Features* | *Spatial Features* |
| * page orientation can be changed | * no reorientation of screen possible |
| * orientation of part of text can be changed | * no reorientation of part of text possible |
| * space can be manipulated to allow fine placing of elements | * spatial increments relate to character width and line increments (no fine placing) |
| * copy can be reduced to fit page size | * size of final display depends on screen size |

Figure 1. Comparison of the graphic and spatial qualities of print and Prestel.

Some of these layers provide quite explicit information, other layers provide coded information. The following lists indicate the ways in which these different kinds of layering may be instantiated in a table.

**Explicit Layers**

General text matter which may be given at the head or foot of the table.
Hierarchical headings which relate to more than one row or column heading.
Specific row or column headings which lead readers to one piece of data in the field of the table.
Data in the field of the table.

**Coded Layers**

Unfamiliar codes which need a decoding key, or explanation, in order that the information can be understood by readers.
Conventional codes which need no explanation (e.g., the use of italic for foreign words, or abbreviations such as a.m. and p.m.)

These six layers are potentially available for simultaneous use in any table. However, they will not necessarily be realised in any specific table, nor will they be equally transferable across presentation media. By the use of graphic and spatial features all these layers can be defined and separated, or arranged

together in such a way that the relationships between them are clear. This gives a table its graphic structure. In the tables which we will be examining in detail all layers are realised.

Figure 2 shows the kind of conventional printed tabular array which will be familiar to many users of technical information. Perhaps the first thing that most users would notice about the table is that its orientation on the page is different from the rest of the printed matter. The original booklet in which the table was published was in portrait (upright) format. The wide table would not fit unless rotated through 90 degrees. This kind of rotation is common and easily done in a printed medium. Such rotation can be applied to the table as a whole and to individual elements within the table. For example, reorientation of the column headings (see Figure 2) is also commonly done, and will be familiar to many people from bus and train timetables where long placenames have to be accommodated.

In Figure 2 additional information is given in headings which span the three groups of columns, and also by hierarchical headings above two groups of row headings. The main table heading is in bold, red type of a large size. Attention is drawn to the variety names which form the column headings by having them in bold, red type. The text about the table is in larger type size than the rest of the table. All of these methods are commonly used for headings, though until recently colour was less common because of its additional cost.

Within a table, grouping items together is recommended as an aid to horizontal reading (Wright, 1982). This is usually done by the introduction of space every five items or so, or by the use of rules. The tables shown in Figures 2 and 3 contrast strongly with each other in terms of grouping. In Figure 2 the table has a tight visual structure created by the use of rules. Heavy rules at top and bottom define and separate the table from headings, general text, and keys. Within the table fine horizontal rules have been used to separate groups of items which belong together. Fine vertical rules separate columns about a single variety from each other and a double rule separates the different groups of varieties. In contrast the table shown in Figure 3 uses space rather than rules, and achieves rather loosely structured columns. For example, the five columns under the heading "Diseases" are not immediately seen as columns. Similarly, the width of the columns and the space between them appears to be dictated by the length of the column headings. The rows have not been grouped in any principled way; the intermittent horizontal space, which seems to create some perceptual grouping, arises simply because a row heading or item is too long for one line.

Both tables in Figures 2 and 3 are fairly heavily loaded with reference devices and their keys. For example, in Figure 2 capital letters have been used in the column headings and the key to their meanings is placed in the top left hand corner of the table, an unusual location. It is more conventional to place

## RECOMMENDED LIST OF SPRING BARLEYS 1981

The control for yield comparisons is the mean of Ark Royal, Athos, Georgie, Goldmarker, Porthos, Sundance and Triumph. Differences less than 3% among fully recommended varieties and less than 4% for comparisons involving provisionally recommended varieties should be treated with reserve.

| Varieties classified for General use G, Special use S, Provisional recommendation P, Becoming outclassed O | Recommended | | | | | | | Provisionally Recommended | | | | | | | | Becoming Outclassed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Goldmarker | Georgie | Athos | Tyra | Ark Royal | Midas | Keg | Triumph | Kym | Koru | Egmont | Flare | Atem | Claret | Tintern | Sundance | Aramir | Porthos | Lofa Abed | Mazurka |
| | G | G | G | S | S | S | S | PG | PG | PG | PG | PG | PG | PG | PS | O | O | O | O | O |
| **Agricultural Characters:** | | | | | | | | | | | | | | | | | | | | |
| Yield as % of control .. .. | 103 | 100 | 99 | 98 | 96 | 95 | 95 | 107 | 107 | 105 | 105 | 104 | 104 | 103 | 97 | 98 | 97 | 97 | 96 | 96 |
| Standing power .. .. .. | 6½ | 7 | 8 | 5½ | 6 | 7½ | 8 | 9 | 6½ | 7 | 6½ | 8 | 7 | 8 | 6½ | 6½ | 8 | 7½ | 5½ | 6 |
| Shortness of straw .. .. | 8½ | 7½ | 6 | 7 | 5½ | 8 | 6½ | 8 | 7 | 6 | 5 | 7½ | 5½ | 7 | 6 | 6½ | 6 | 6 | 6½ | 5 |
| Earliness of ripening .. .. | 7 | 7 | 7½ | 7½ | 4½ | 6 | 7½ | 5½ | 7 | 6½ | 6½ | 7 | 6½ | 7 | 6½ | 6½ | 7½ | 7 | 5½ | 8 |
| Resistance to mildew .. .. | 8 | 5 | 7 | 7 | 6 | 7 | 5 | 8 | 8 | 5 | 8 | 6 | 9 | 9 | 5 | 7 | 6 | 4 | 6 | 6 |
| Resistance to yellow rust .. | 6 | 5 | 7 | 4 | 5 | 4 | 3 | 7 | 4 | 4 | 6 | 3 | 6 | 5 | 8 | 5 | 6 | 7 | 5 | 4 |
| Resistance to brown rust .. | 3 | 5 | 5 | 4 | 3 | 1 | 3 | 7 | 5 | 5 | 6 | 4 | 4 | 5 | 6 | 6 | 4 | 5 | 5 | 4 |
| Resistance to *Rhynchosporium* .. | 5 | 4 | 5 | 7 | 6 | 5 | 5 | 5 | 6 | 7 | 6 | 5 | 6 | 5 | 6 | 5 | 3 | 5 | 4 | 3 |
| Resistance to loose smut .. | 6 | 2 | 8 | 3 | 8 | 5 | 4 | – | – | – | – | – | – | – | – | 3 | 2 | 9 | 6 | 2 |
| Resistance to cereal cyst nematode (R) .. .. .. | – | – | – | R | – | – | – | – | – | – | – | – | – | – | R | – | – | – | – | – |
| Resistance to ear loss .. .. | 7 | 5½ | 4½ | 5 | 7½ | 7 | 5½ | 5 | – | 6½ | 6 | 7½ | 5½ | 7½ | 5½ | 5½ | 6 | 4½ | 8 | 3 |
| Malting grade .. .. .. | 4 | 1 | 4 | 1 | 8* | 4 | 8* | 9 | 7 | 1 | 1 | 1 | 6 | 5 | 5 | 4 | 3 | 6 | 1 | 2 |
| 1,000 grain weight .. .. .. | 5 | 7 | 6 | 7 | 5 | 4 | 5½ | 6½ | 7½ | 7 | 8 | 7 | 7½ | 6 | 5½ | 6 | 6 | 6 | 6 | 6 |
| Specific weight .. .. .. | 6 | 6½ | 5½ | 5½ | 6 | 5 | 6½ | 6 | 7 | 6 | 6½ | 6 | 7 | 5½ | 6½ | 6 | 7 | 5½ | 6½ | 6 |
| Year first listed .. .. .. | 1978 | 1976 | 1977 | 1976 | 1976 | 1970 | 1978 | 1980 | 1981 | 1980 | 1980 | 1980 | 1980 | 1980 | 1980 | 1976 | 1975 | 1977 | 1971 | 1972 |

A high figure indicates that the variety shows the character to a high degree.

* Recommended by the Institute of Brewing as malting varieties, although new varieties may not have been proved on a commercial scale.

Figure 2. A common way of displaying tabular information in print. This figure is reproduced by courtesy of the National Institute of Agricultural Botany, Cambridge.

Figure 3. A multi-column table in which the use of vertical space is determined by the length of items rather than the structural relationships between items. This figure is reproduced by courtesy of Her Majesty's Stationery Office.

**Fungicides — Winter wheat mildew**

| Active ingredient | Proprietary name | Latest time of cleared use (GS) | Approx cost of fungicide £/ha (£/acre) | Diseases controlled or partially controlled |
|---|---|---|---|---|
| ethirimol | Milgo E* | 51 | 7.26 (2.94) | Mi |
| fenpropimorph | **Corbel** | 59 | 12.66 (5.12) | Mi Br Yr |
| | **Mistral** | 59 | 12.66 (5.12) | Mi Br Yr |
| prochloraz | Sportak | 59 | 17.00 (6.88) | Mi Ey Sep |
| propiconazole | Radar | 71 | 14.08 (5.70) | Mi Br Ey Sep Yr |
| | Tilt | 71 | 14.08 (5.70) | Mi Br Ey Sep Yr |
| propiconazole + carbendazim | Tilt mbc | 59 | 16.90 (6.84) | Mi Br Ey Sep Yr |
| sulphur (†) | Brooklane 85* | up to harvest | 4.32 (1.75) | Mi |
| | Elosal* | | 3.53 (1.43) | Mi |
| | GRN Flowable Sulphur* | | 7.80 (3.16) | Mi |
| | Thiovit* | | 7.96 (3.22) | Mi |
| thiophanate-methyl | **Cercobin Liquid** (b) | 31 | 11.90 (4.82) | Mi Ey |
| triadimefon | **Bayleton*** | 71 | 13.41 (5.43) | Mi Br Yr |
| triadimefon + captafol | Bayleton CF* | 70 | 24.70 (10.00) | Mi Br Sep Yr |
| triadimefon + carbendazim | Bayleton BM* | 71 | 19.07 (7.72) | Mi Br Ey Sep Yr |
| tridemorph | **Bardew*** | | 9.19 (3.72) | Mi Yr |
| | **Calixin*** | | 9.21 (3.73) | Mi Yr |
| | Ringer* | | 9.24 (3.74) | Mi Yr |
| tridemorph + carbendazim | **Bardew + Focal Flowable** | 6 weeks before harvest | 16.54 (6.69) | Mi Ey Yr |
| | **Calixin + Bavistin*** | | 18.70 (7.57) | Mi Ey Yr |
| | **Calixin + Bavistin FL*** | | 18.70 (7.57) | Mi Ey Yr |
| | Ringer + Carbate | | 15.57 (6.30) | Mi Ey Yr |
| tridemorph + carbendazim + maneb | **Cosmic*** | 71 | (a) 21.52 (8.70) | Mi Br Ey Sep Yr |
| triforine + carbendazim + maneb + mancozeb | Brolly + Kascade | 59 | 17.25 (6.98) | Mi Br Ey Sep Yr |

**Approved products in bold type**

Br — brown rust, Ey — eyespot
Sep — septoria, Yr — yellow rust
Mi — mildew

*Cleared for aerial application
(†) Repeated applications of sulphur may be required
(a) Cosmic Approval (for moderate attacks only) and cost are for 2 spray programme
(b) Cercobin Liquid Approval is for moderate attacks only

keys at the foot of the table, as in Figure 3 where several keys are used to explain the use of reference devices (asterisk and dagger) and the abbreviations of the disease names which have been given in the field of the table, and the alphabetic parenthesis given beside some entries.

Typographic variants such as italic and bold are frequently used to show relationships between parts of a text (e.g., all headings of a particular level in bold). They may also be used to emphasize a word or phrase in the text. Such variants have been used in both tables. In Figure 2 italic has been used in the conventional way to signal the latin name of one of the diseases: in Figure 3 bold has been used to show which fertilisers are approved. Strictly speaking, underlining is not a typographic variant; it is usually associated with typewritten material where it is so often used in place of italic. However, in Figure 3 underlining has been used to show which diseases are controlled. It is interesting to note the different ways in which readers are given explanations of the meanings of these typographic variants. Whereas the use of bold in Figure 3 is explained in a note at the foot of the table, the use of underlining is explained by example (the word "controlled" in the column heading being underlined). This kind of decoding by example is also used in Figure 2. There the explanation of the capital letter R in the field of the table is given in parenthesis at the end of the row heading of the line on which it occurs, i.e. the heading "resistance to cereal cyst nematode (R)".

From year to year the overall visual structure of these printed tables tends to remain the same. Sometimes the size of type will be different for one or other layer of information, generally depending on how many items of information have to be accommodated. Other small changes may be made; for instance, row headings may be indented under a hierarchical heading, but the information in the tables seems to be sufficiently usable by the intended audience for there to be no pressure on the information providers to enhance their presentation.

Although the visual structure of the printed tables tends to be static, the same cannot be said of the tables when presented on Prestel. Different approaches have been tried at various times. These changes no doubt reflect the difficulties of transferring such large quantities of information onto a system which can only display small quantities at a time. Before looking in detail at the tables on Prestel, we should examine the restrictions which that system imposes on the quantity and quality of the material which can be displayed at any one time. Design decisions have to take these constraints into account.

Space limitations are severe. There are only 40 character positions across the screen, and only 22 usable lines down the screen. This gives a total of 880 character positions, and it must be remembered that space between words usually occupies one position. This capacity can be contrasted with the

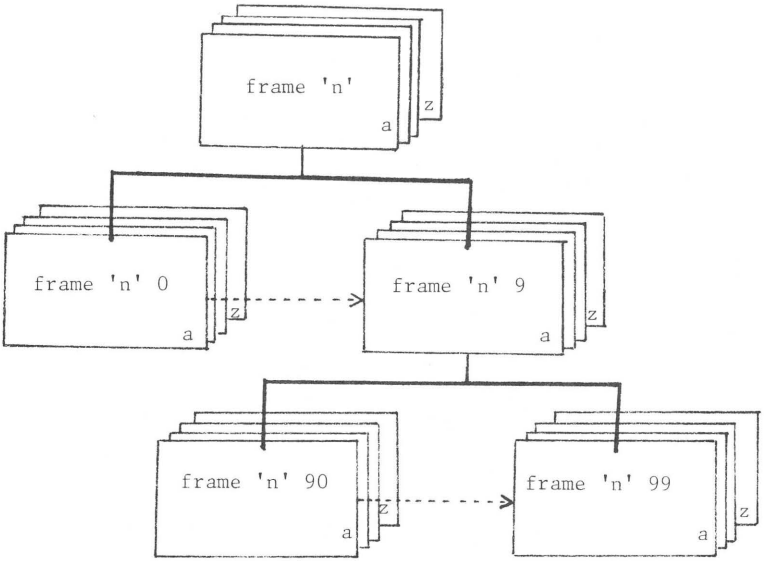



Figure 4. Diagram showing the tree structure of Prestel in which the user works through successive frames (screenfuls of information) from the top of the tree moving towards the bottom.

demands of the table shown in Figure 2, which has about 50 lines and about 140 character positions across the row in the type size of the footnotes—a total of about 7000 character positions. On Prestel the number of usable character positions is further reduced if extra facilities such as colour, double height characters, or flashing are used, because the codes for these special facilities take up a character position even though the codes do not appear on the screen.

Space on the screen may be severely limited but Prestel deals with this in two ways. It provides continuation frames which are sequentially accessed by pressing the key labelled #. These continuation frames give additional information at the same level within the viewdata structure; Prestel also has the advantage of a tree structure database. This is outlined in Figure 4 where the continuation frames are denoted by the letters a-z and the menu choices are denoted by the numbers 0-9 indicating that from any frame up to 10 alternatives may be offered to the reader. Within Prestel a specific region will be designated by a number "n" at the topmost level of the tree. This number will be carried forward through all subsequent levels, picking up additional numbers at each level, which are in turn carried forward to the lower levels. Although only three levels of the tree are shown in Figure 4, in practice the number of levels can be much more than this. People familiar with the system can jump straight to any frame at any level if they know the number of the

£5:BASE 20313111b 0p
SPRING BARLEY VARIETIES - RECOMMENDED

| VAR | YLD | RESISTANCE | | | STDG POWR | EARL NESS | RES. to EAR LOSS | Q |
|---|---|---|---|---|---|---|---|---|
| | | Mil dew | Yel rst | Br rst | | | | |
| Recommended | | | | | | | | |
| Tri | 106 | 8 | 7 | 8 | 8 | 5 | 6 | 9 |
| Atem | 106 | 9 | 5 | 5 | 5 | 6 | 6 | 6 |
| Kym | 105 | 6 | 5 | 6 | 4 | 7 | 5 | 6 |
| Provisionally Recommended | | | | | | | | |
| Patty | 106 | 7 | 8 | 7 | 5 | 7 | - | 5 |
| Carval | 105 | 7 | 7 | 8 | 8 | 5 | - | 6 |
| Golf | 103 | 4 | 7 | 6 | 7 | 6 | - | 1 |
| Tasman | 103 | 8 | 8 | 8 | 9 | 5 | - | 9 |

Key # Outclassed Varieties 9 Triumph
Type CMD (CTRL C) to leave

Figure 5a. The limited space on the screen here leads to stacking of information in the column headings and to the intrusion of row subheadings across several columns.

Figure 5b. This is a continuation frame for Figure 5a. It contains information which the designer was unable to display in 5a because of the severe space limitations on CRT screens.

£5:BASE 20313111c 0p
SPRING BARLEY OUTCLASSED VARIETIES

| VAR | YLD | RESISTANCE | | | STDG POWR | EARL NESS | RES. to EAR LOSS | Q |
|---|---|---|---|---|---|---|---|---|
| | | Mil dew | Yel rst | Br rst | | | | |
| Egmt | 103 | 6 | 7 | 6 | 4 | 6 | 6 | 1 |
| Gldmk | 100 | 6 | 7 | 4 | 4 | 7 | 7 | 3 |
| Koru | 100 | 2 | 6 | 6 | 4 | 6 | 6 | 1 |
| Athos | 98 | 7 | 8 | 6 | 7 | 7 | 4 | 3 |
| Georg | 96 | 3 | 6 | 6 | 5 | 7 | 5 | 1 |

Key 9 for Triumph and Atem

Type CMD (CTRL C) to leave

frame they want. Typical frame numbers are shown to the right of the top row in Figure 5.

In the preceding discussion of printed tables I have gone into several of the typographic features, particularly the graphic and spatial features, by which the various layers of information within a table are realised. These features give tables their visual structure. On Prestel one way of realising the visual structure of information is by the use of colour. It is usually cited as one of the advantages of Prestel that seven colours are available free as part of the system. These can be used for text or graphics but, as has been mentioned, their codes take up valuable character positions on the screen. Those who write about design for viewdata and other similar systems urge great caution in the use of colour (Reynolds, 1979; Whelan, 1982). The Prestel tables created by ADAS did include colour. Although this will be mentioned in the following discussion where appropriate, a fuller discussion of the colour facility would be more meaningful in a medium which allowed these colours to be communicated faithfully. This illustrates that not only are there problems moving from print to CRT but there can be difficulties encountered when moving in the other direction as well.

I have introduced the notion of different layers of information—some explicit, some coded—which can be provided simultaneously in tabular matter. The problem of the information designer on Prestel is how to handle these different layers. Can the layers be separated from each other, and so enable the designer to take advantagae of the tree structure? Or are the layers inseparable? If this is the case then the limited screen size means that the amount of data within the field of the table must be reduced. When making any reductions to the information in the table, care must be taken to retain the layers of information leading to the interpretation of the data.

Some layers of information are more obvious candidates for separating onto single frames. Explicit information contained in text matter at the head or foot of the table falls into this category, as do headings. An example of the way in which the column headings in Figure 2 might be put onto separate frames will be discussed later in conection with Figures 7a and 7b.

Coded information seems, logically, to be inseparable from its key. If the information is to remain coded, space must be provided for these codes and for the key to be given on the same frame. Anyone who has tried to interpret a television weather forcast in which symbols are used, but in which the key is shown on a separate frame, will be aware of the dangers of separating the two. However, coded information can always be made explicit to allow for a different approach to structuring.

Various approaches have been tried by MAFF/ADAS to the problems of translating their printed tables for Prestel. Figures 5a and 5b show a structure which is recognisably tabular and in which little restructuring of the layers has

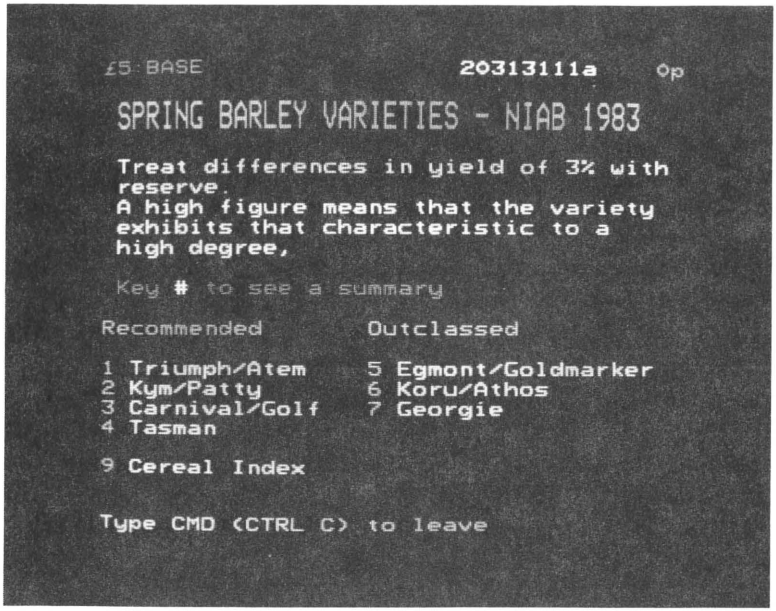



Figure 6a. A visual display which capitalises on the tree structure of Prestel by displaying only the headings from the printed table.

taken place. However, row and column headings have been swapped around and some information has been omitted: there were 15 rows in the printed table, but there are only 8 columns here. On Prestel column headings cannot be rotated through 90 degrees to make them fit, so instead they have been stacked. This has led to some rather unconventional and inconsistent use of abbreviations—a problem made even harder for the reader because no key is provided. The table is visually structured by the use of hierarchical row headings which have been allowed to run into the field of the table. Help for horizontal reading has been provided by alternating the colour of the rows (headings and data). The table is given additional structural unity by the use of space and by the lines separating the column headings from the field of the table. This kind of display reflects the attempt to maintain similarity of visible language between print and screen.

In Figures 6a,b,c we can see that the potential of the medium is beginning to be understood by the information designers. A move has been made away from the kind of tabular structures used in print. Figures 6a shows an index frame combining explicit information taken from the table heading, the general text matter, and the column headings. Users can choose to see either "Recommended" or "Outclassed" varieties which are paired for comparison. These options are arranged in a headed list structure (two columns). Figure 6b

```
£5 BASE                          203131111a   Op
 SPRING BARLEY VARIETIES - TRIUMPH

YIELD                              106
STANDING POWER                       8
EARLINESS of RIPENING                5
RESISTANCE TO
   Mildew                            8
   Yellow rust                       7
   Brown rust                        8
   Rhynchosporium                    7
   Loose smut                        3
RESISTANCE TO
   Cereal cyst nematode              -
   Ear loss                          6
MALTING GRADE                        9
1000 GRAIN WEIGHT                    6
SPECIFIC WEIGHT                      6

Key # for Atem
Key 9 for Variety List

Type CMD (CTRL C) to leave
```

Figure 6b. The information display resulting from selecting option 1 in Figure 6a. This is information at the next level down in the Prestel tree.

Figure 6c. The information display resulting from keying # in Figure 6b to access the continuation frame.

```
£5 BASE                          203131111b   Op
SPRING BARLEY VARIETIES COMPARED WITH
            TRIUMPH
                                  Atem    Triumph

YIELD                              106       106
STANDING POWER                       5         8
EARLINESS of RIPENING                6         5
RESISTANCE TO
   Mildew                            9         8
   Yellow rust                       5         7
   Brown rust                        5         8
   Rhynchosporium                    7         7
   Loose smut                        3         3
RESISTANCE TO
   Cereal cyst nematode              -         -
   Ear loss                          5         6
MALTING GRADE                        6         9
1000 GRAIN WEIGHT                    7         6
SPECIFIC WEIGHT                      7         6

Key 1 for Kym
Key 9 for Variety List
Type CMD (CTRL C) to leave
```

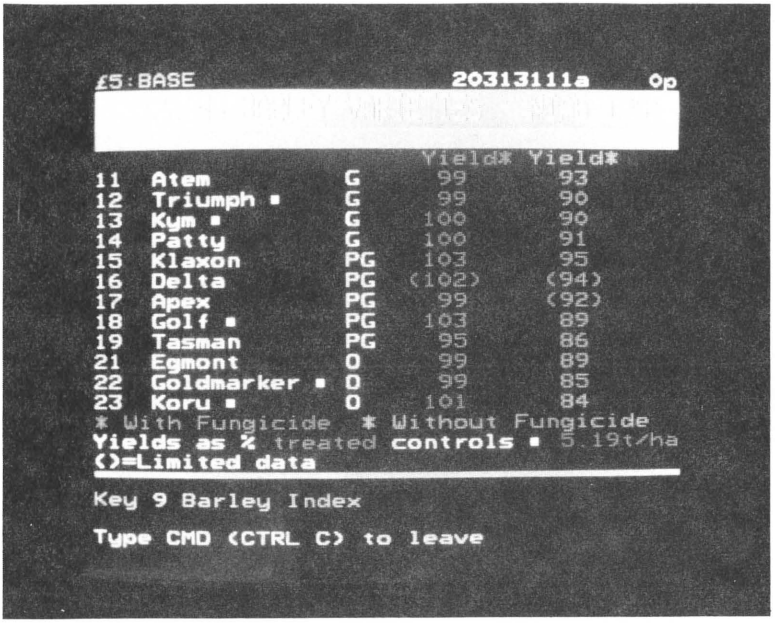



Figure 7a. An illustration of a Prestel frame which allows readers to access the data through the information which had been given in the column headings of the printed table (Figure 2).

shows the frame that is reached by choosing "1" from the "Recommended" list given in Figure 6a. In Figure 6b the information is presented as a simple kind of table structure with hierarchically arranged row headings (similar to the printed table in quantity and arrangement) but with only one column of information relating to one variety "Triumph". By keying # to access the continuation frame, the user can see data about a second variety alongside the first (Figure 6c). The column structure in Figure 6c is emphasized by the use of space (a little less might have made it easier to relate row and column headings and data). The use of hierarchical headings in the rows leads to some spatial grouping of information within the columns. All the layers of information displayed in this table are explicit.

A third approach does away with the conventional tabular structure and sorts the layers of information in yet another way. In this instance explicit and coded layers of information, of the same kind as the printed table shown in Figure 2, have been used but their ordering and display are rather different. The first Prestel frame encountered by the user functions as an index to the other levels (Figure 7a). Its visual structure is tabular but the columnar "sub-structure" is emphasized by using a different colour for each column. This index contains both explicit and coded information. Some of the coded

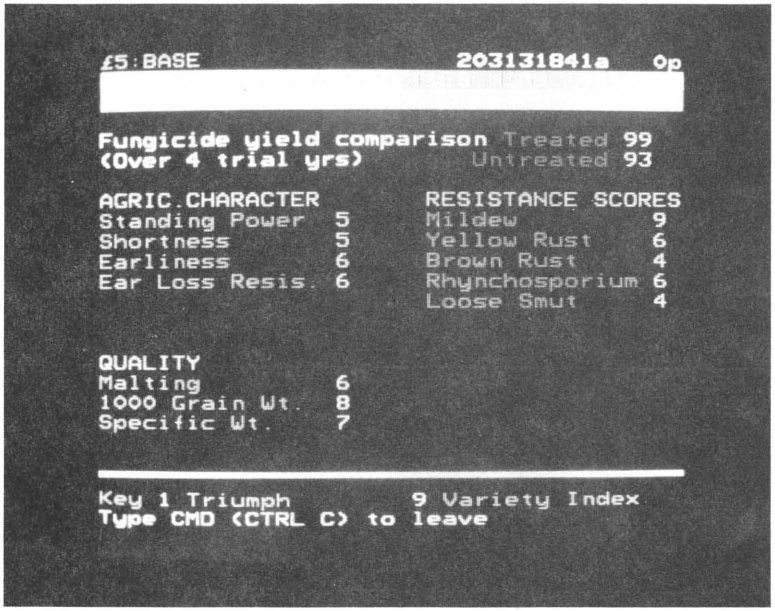



Figure 7b. An alternative to Figure 7a for readers who wish to access the data through the information given in the row headings of the printed display.

information (e.g., the use of asterisks) is explained in a key at the foot of the table, but the use of the capital letters "G, PG, O", which had been explained in the printed table, is left unexplained in the Prestel display. By keying 11 from this frame the user arrives at the frame giving explicit information about one variety (Figure 7b) and some general information of the kind usually given at the head of a printed table. The overall visual structure of this frame can be contrasted with that of column 14 in Figure 2. Note the omission of fractional values on the Prestel frame, where only decimal values can be easily displayed without ambiguity.

So far we have been concerned with Prestel displays of the printed table shown in Figure 2. The problems are slightly different for the table shown in Figure 3. Figures 8 and 9 show two approaches to handling this kind of printed information. The visual structure shown in Figure 8 closely resembles that of the printed table. Although in essence a tabular structure, the columns have been additionally emphasized by putting them in different colours. Two explicit layers of information have been omitted: the names of those fungicides not recommended, and the "active ingredient" column.

At first glance the two Prestel tables shown in Figure 8 and 9 look similar in structure, each being a simple matrix. However, there is a big difference in the way coded layers of information are handled. The function of separation

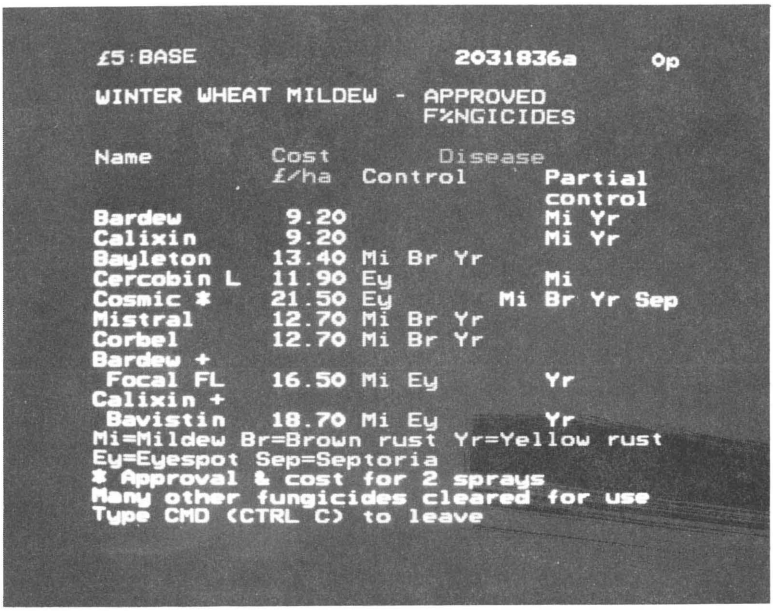
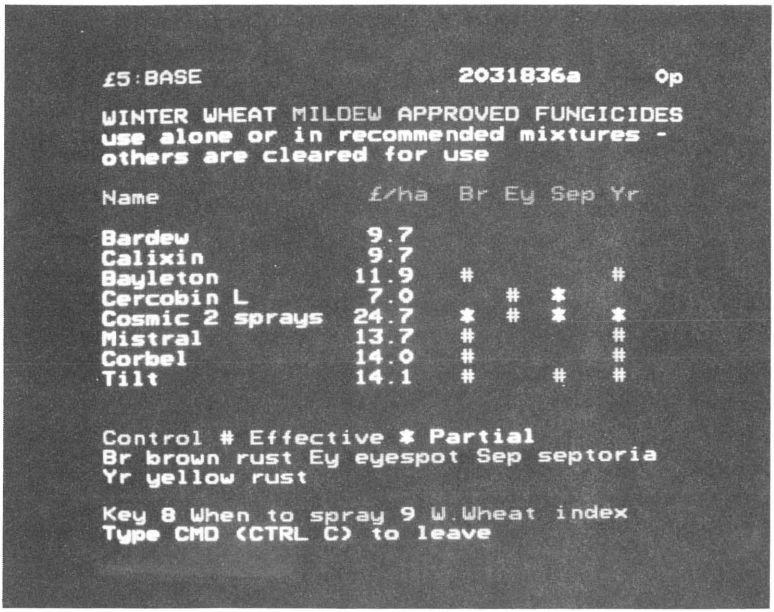



Figure 8. A Prestel display of the information from Figure 3, showing some of the effects of limitations on space and typographic variants such as underlining.

Figure 9. As a way of coping with the space limitations of the medium, the matrix of Figure 8 has here been inverted, the body of the previous table now provides the column headings.



between total and partial control, which was fulfilled in the printed table by underlining, is carried out in Figure 8 by having two separate columns for disease control, one being headed "partial control". The separation is further emphasized by presenting each column in a different colour. The data given under these columns is still in coded form (abbreviated disease names) and a key is provided at the foot of the table. Spatial limitations of the CRT screen prevent the alignment of these diseases which was a feature of the printed display. The use of different colours for each column of the Prestel display is potentially more useful if there should at some future date be four diseases appearing in the "control column". The data in the two columns would then start to interleave and colour would show which heading related to which item of data.

In Figure 9 an attempt has been made to come to terms with the spatial restrictions of Prestel. Here the relevant section of the printed table has been inverted and the abbreviated disease names have become column headings. Control and partial control are now signalled within the body of the table by the symbols # and *. As these two symbols are not visually very distinct from each other, they are also coded different colours.

It is difficult to discuss and illustrate the visual structuring of the Prestel frames in the same kind of detail as the printed tables because of the limitations of printed journals, but the intention has been to give sufficient information to exemplify the different approaches to handling explicit and coded layers of information with tables which MAFF/ADAS has adopted. One problem relating to the presentation of tables on Prestel which has not so far been mentioned concerns the simultaneous display of numbers some of which are data and some of which are menu selections for proceeding to the next frame. Figure 7b illustrates the potential for confusion. Perhaps in time new conventions will emerge.

Clark (1983) states, "Presentation begins with the questions, 'What do you want to show about the data?'" If we apply that question to the printed tables we have been discussing, the answer seems to be "everything". In the case of Prestel the particular features of the medium inevitably force constraints on the amount of information that can be displayed simultaneously. Consequently, when moving tabular information from print to CRT screens, information providers need to ask themselves four kinds of questions:

1 What information do I want to convey and what do I want to say about it?
2 What kinds of information will the user want combined at any one time?
3 What strategies can people be expected to use to get the particular data they want?
4 How can the spatial and graphic features of the medium be exploited to aid the user?

In short, the information provider needs to ask the kinds of questions which ensure that the display of information will result in an efficient communication with the user. Our detailed examination of some approaches to displaying information on Prestel shows this to be a considerable task.

In printed media the flexibility and capability of printing systems allows information providers to sidestep some of the questions listed above. Instead the professionals can be more single-minded and can construct what Clark (1983) calls "efficient storage" for the data. The responsibilities for knowing how to access the data, correctly interpreting it, and using it effectively are delegated to readers. These readers need considerable skills to be able to carry out this task (Wright, 1981). Whether the demands on these skills are increased or reduced by moving tables from print to CRT screen will depend upon how successfully information designers find ways of answering the four questions listed above.

Presenting information in a new medium is not just a question of transferring, or even translating, the information from the old to the new. It involves coming to terms with the medium, understanding the structure of the information (the different layers); as well as having knowledge of the users and their requirements. Printed media have been around for so long now that it sometimes seems as if the need for these different kinds of understanding are no longer appreciated. Maybe the advent of new communication media will force people to look again at the underlying dimensions of successful information design, particularly as it applies to tables.

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