When to use numeric tables and why
Guidelines for the brave

By Sally Bigwood and Melissa Spore

In this age of high graphics and electronic "solutions", the humble numeric table faces strong and often ill-informed opposition. Many believe that tables are intrinsically less interesting than the alternatives. Nonsense! Those with an interest in (or a compulsion to learn about) a subject are interested in relevant numbers. You don't need to trick people into looking at them. As Professor Tufte says: "If the statistics are boring, then you've got the wrong numbers..."[1] A more justifiable criticism is that tables are often poorly designed and difficult to read and interpret. This is true but the charge equally applies to the alternatives.

In the 21st century the challenge is to be brave enough to resist the lure of charts[2] or electronic "solutions" and, when appropriate, put your faith in a good table. By "good" we mean a table that communicates with ease. If a table does not communicate with ease then it fails in its fundamental purpose. While this article is written with paper documents in mind, the definition of "good" can be applied to graphic displays in any media.

The principles and ideas in this article have an evidence base. We would direct readers to British Standard 7581:1992 *A Guide to the Presentation of Tables & Graphs* as well as Professor Tufte's *The Visual Display of Quantitative Information*. The work of British statisticians Ehrenberg and Chapman[3] is also relevant, although presently out of print.

To start at the beginning

Tables are one of a number of tools to communicate numbers, each developed to meet specific needs. Obviously a table should be used when it is most efficacious to do so and, according to the experts, this is frequent. Fig 1 on the next page sets out which "tool" to use when.

Further experts have specified instances when tables ordinarily out perform charts and these are:

- Reference material. (See below under table types.)

- When readers need to know the numbers. (Data labels clutter charts and tiny numbers dotted around a chart are difficult to read and compare.)

- Where the data includes more than one unit of measure. For example, Fig 2 contains two units of measure: thousands in population, and numbers in employment and with a limiting long term illness. Graphical depictions of two

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[1] Tufte: *The Visual Display of Quantitative Information*, page 80.
[2] We use the term "chart" to mean bar, line, pie charts, scattergrams and histograms.
[3] A.S.C. Ehrenberg: *A Primer in Data Reduction*, John Wiley & Son, 1982 and Myra Chapman and Cathy Wykes: *Plain Figures, Second Edition* London: The Stationery Office, 1996.

units of measure require two 'Y' axis labels – always messy and prone to misinterpretation.

- Data with a wide range. (Small quantities evident on a table may be lost on a chart.)

BS 7581 goes even further. It states: "Graphs are preferable for showing trends or relationships that would be difficult to detect within a table…"[4] In other words, tables are the default position. Only use an alternative when you know it will express your ideas more clearly than a table.

Fig 1 Effective use of tables and charts

Each ✓ indicates functionality   *CHECK THE DEFINITION OF 'CORRELATION'!!*

	Comparing quantities	Parts of a whole	Trends over time *	Correlation of two variables	Reference material	Explanation/ comment
Bar	✓	✓	✓			
Line			✓✓			
Pie		✓				Communicates most effectively if kept to two or three slices.
Histogram	✓					Show the distribution of data in a series of progressive ranges.
Scattergram				✓✓		indicate if there is a relationship between two variables.
Table	✓✓	✓✓			✓✓	

* or over other continuums, for instance, accidents per miles driven.

Design is crucial
Poor design is off putting and can confuse and mislead readers. The essentials to designing a readable table are, first, choose the correct type of table and, second, use a layout that emphasises the numbers. These are explained below.

Table types   There are two types of numeric tables: demonstration and reference. Demonstration tables express a particular point and should be short and to the point. Data on a demonstration table is ordinarily ordered by size and rounded allowing patterns and exceptions to stand out. Fig 2 below is an example.

Reference tables, on the other hand, are used to organise and store raw data. Examples include: government statistical tables, bus timetables, football result tables, sales or performance statistics, budget books, etc. One function of reference tables is to provide a source of data for demonstration tables. Parenthetically, the best charts (those that communicate with ease) are like demonstration tables: they do not present odd reference data but tell an explicit story with selected numbers.

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[4] BS7581:1991 *A Guide to the Presentation of Tables & Graphs* British Standards Institute, Para 4.1.1 page 4

Fig 2 A demonstration table

The demonstration table below is succinct and purposeful. The data is ordered by population size for convenient comparison. This allows patterns to be identified: in this case, the greater the population, the more people in employment and the more with a limited long term illness. The exception is, of course, Barchester which has the second largest population of the four wards, but has the highest number of people in employment and the lowest number with a limiting long term illness.

No chart or visual can present this data as coherently as this table.

Table 2 Selective ward statistics, 2001 Census, Barchester County Council

| Ward | Population / thousands | Number of people | |
		aged 16-74 in employment	with a limiting long term illness
Wroxeter	17	6,500	2,600
Barchester	16	8,100	1,300
Hallam	14	5,900	1,600
Silchester	13	5,500	1,600

Figures have been rounded.

Reader-friendly tables   The second essential in table design is to emphasis the numbers. In other words, keep the layout as plain as possible. Below are design tips for tables and these are illustrated in Fig 3.

- Use space rather than lines to direct readers. This means avoid gridlines that clutter that make the numbers hard to see. As long as you align to the right numbers take on their own shape, which readers will anticipate and recognise.

- Avoid bold and shading. Both distract the reader from seeing the numbers; compare A and B in Fig 3 below.

- Single space rows and keep tables narrow. Artificially stretched tables make comparisons difficult.

- Order columns and rows logically. Often size (largest to smallest) is the most sensible and convenient way of ordering demonstration tables. For instance, the data in Fig 2 is ordered by population size, allowing readers to compare the four wards quickly. Reference tables are typically ordered alphabetically or chronologically.

- Items to be compared should ideally be in columns rather than rows. See how much easier it is to compare items in Table B than in Table A in Fig 3.

Fig 3 Use order and layout to help readers understand and compare

Tables A and B have the same data, but Table B looks simpler because of its plain design.

Table A – heavily formatted table

Off course returns 2008/09						
	Dogs	**Football**	**Horses**	**Number**	**Other**	**Total**
Turnover £million	**1,646.8**	**980.0**	**6401.6**	**874.6**	**913.9**	**10,816.9**
Gross profit £ million	312.2	221.8	891.6	168.3	123.2	**1717.1**
Number of bets (millions)	**246.8**	**150.7**	**748.4**	**321.1**	**77.3**	**1544.3**

Table B – A plain table
It contains the same data as in Table A but without gridlines, shading or bold. It is single spaced, narrow. Notice that numbers have been rounded and items to be compared are in columns. The data is ordered by size.

Off course returns 2008/09   ✓✓

	Turnover £ million	Gross profit £ million	Number of bets (millions)
Horses	6,600	890	750
Dogs	1,700	310	250
Football	980	220	150
Number	880	170	320
Other	910	120	77
Total	11,000	1,700	1,500

Figures have been rounded so columns may not equal total.

The data above comes from page 4 of *Gambling Commission: Industry Statistics 2008/09*.

Conclusion
Less is often more especially in communication. Although currently unfashionable, tables are frequently the most coherent way of displaying numeric ideas. Keep in mind the difference between reference and demonstration tables and ensure demonstration tables are as succinct as possible. For both types of tables, keep the layout simple and logical, focusing on the numbers. Be brave, be modern. Communicate.

About the authors

Sally Bigwood and Melissa Spore are sisters. Their book, *Presenting Numbers, Tables and Charts*, was published by Oxford University Press in 2003 and is currently out of print. You can read about their work on www.plainfigures.com

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