UNIT 7  EDITING ILLUSTRATIONS, TABLES, CHARTS, AND GRAPHS

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7.0  AIMS

In this unit, you will learn how to edit and handle tables and figures (graphs, charts, diagrams, maps, photos, etc.) so that they serve their purpose efficiently. On completing this unit, you will be able to.

- prepare yourself to handle tables and figures,
- recognize the particular requirements of tables and figures,
- examine tables and figures to check whether they are error-free, reproducible, and well designed, and
- process them to meet the requirements of publishing.

7.1  INTRODUCTION TO EDITING TABLES AND FIGURES

Just as footnotes indicate a scholarly text, tables and figures indicate a scientific text. Because science is all about measuring, observing, and recording, it needs tables and figures to communicate the results of that measuring and recording. Numbers convey precise information compactly: in everyday communication, it is enough to say that Pune and Bangalore have a moderate climate; to become a scientific statement, it must be backed with data about temperature and humidity given in a table starting with a column that lists the twelve months of the year and followed by columns for maximum, minimum, and average values of both temperature and humidity. Similarly, a scientist describing a new plant cannot say that the plant is beautiful and majestic but must include clear photos showing the full plant and details of its leaves, flowers, and fruit.
In science publishing, *figure* is an all-encompassing term: it applies to every kind
of image, whether it is a map, a diagram, a photograph, a chart, or a graph. All
these forms are referred to as figures and numbered in a single sequence.

As an editor, you may well ask: "I can edit any text for grammar, spelling, punctuation,
style, and so on [see Block 1 Unit 3], but what is there to edit in a table or a
picture?" Read on, and you will find the answer to your question. At the very least,
you will need to make sure that a given table can fit within the space depending
on the size of the publication and the form in which a figure has been supplied is
suitable for printing. (For examples of illustrations, graphs etc. please see Unit 10,
section 6 of this course.)

### 7.2 HOUSEKEEPING

Housekeeping is particularly important for tables and figures. It is common for
scientific text to be revised in the light of the comments made by reviewers and
other experts, who may recommend that the author remove a table because it is
superfluous, add a table to supply additional data, or provide a clear photograph to
supplement verbal description. Making these changes will mean that some tables or
figures need to be renumbered—and references to them in text updated accordingly.

Housekeeping is also important to keep track of all material, particularly because
figures and tables are often received separately from text. As with text, authors will
send you figures in the form of printed or scanned images, maps, sketches, 35 mm
slides, soft copies (electronic files) in different formats depending on the software
package used for creating the figures (*.cdr for CorelDraw, *.ppt for PowerPoint,
*.jpg for photos taken with a digital camera, and so on). It is best to maintain a
logbook or a diary to record these details. For soft copies, make it a practice to
routinely scan them for virus and then to open them and to take printouts at the
earliest opportunity and in any case before acknowledging them so that you can
notify authors of problems if any.

Make sure that every table and figure is mentioned in the text. Highlight the first
mention of each figure and table in the text. If working with a printed copy, draw
a box in the margin next to the line in which a table is mentioned and write the
number of that table in the box. Do the same for figures, using a circle instead of
a box.

### 7.3 WHY TABLES

As mentioned earlier, tables serve as containers for data and offer a compact way
to display and retrieve numerical information. Take the results of a census, for
example. Enumerators visit every household and fill in the questionnaire drawn up
for the census. The questionnaire covers many items of information in respect of
each member of the household: age, sex, place of birth, education, mother tongue,
and so on. If the data that enumerators collect are to make sense, they have to be
tabulated. Whereas text is linear, tables are two-dimensional. Once the data are
organized into a matrix of rows and columns, users can retrieve information using
different points of entry: census data make it possible to find out the level (percentage)
of literacy in Haryana, for instance, or to compare the literacy levels in Kerala,
Punjab, and Bihar; the same table can also show the sex ratio in different states.

### 7.4 WHY FIGURES

Figures are pictures of numbers. Although not precise, figures can communicate
trends or patterns instantly. Take a table that gives hourly traffic at different intersections in a city hour by hour over 24 hours for weekdays and weekends. It is possible to look at such a table and detect trends. However, if the data are plotted in the form of a graph, you can see at a glance, for example, that traffic intersections in central business districts (ITO or Connaught Place in Delhi or Hutatma Chowk in Mumbai, for example) record peak traffic around the opening and closing times of offices on weekdays but little traffic on weekends whereas those intersections around shopping districts or around cinemas record heavy traffic on weekends.

Figures convey large differences in magnitudes better than tables can and, at the same time, convey the subject or topic instantly: consider a diagram that shows the number of deaths due to pollution in different districts in West Bengal by using multiples of the familiar symbol of death - skull and crossbones; the more the number of deaths, the more the number of times the symbol is repeated.

Figures also convey the kind or genre of a publication: cartoons indicate a light, easy-to-understand treatment of a topic for the general reader; complex diagrams convey a technical treatment of the topic for experts; and large, full-colour photos signal a 'coffee table' book.

Check Your Progress 1

Write a short note explaining the significance of tables and figures in scientific publications.

7.5 TABLES OR FIGURES?

If tables are storage bins, figures are showcases: tables store data systematically so that any particular value (the lowest temperature in Pune or literacy percentage in Orissa, for instance) or a set of values (states in descending order of population density or the price of milk in different states, for instance) can be easily located whereas figures display the data—you can see at a glance, for example, that the price of petrol has been increasing steadily for the past 10 years or that infant mortality in India has been decreasing steadily since 1970.

Therefore, if the data are given for reference – different readers may put the data to different uses - a table is the better choice. Second, if exact values are important, tables are essential: a graph can show how the rupee has been fluctuating in its value against the dollar, for example, but you will need a table to know its exact value on a given day. Third, tables are the only choice for large data sets with many variables (data on average weight, height, gestation period, composition of milk, lifespan, and so on of a number of mammals, for example).

If the data have an inherent pattern, converting them into a graph will convey that pattern at a glance. A graph is also better than a table in attracting readers; a sprinkling of well-designed graphs makes a document more attractive. And because graphs convey information more quickly, they are frequently preferred in presentations.

7.6 TABLES

Just as editing text (see Block 1 Unit 3) requires you to pay attention to spelling, grammar, style, and so on, editing tables requires you to focus on different parts of each table starting from table number and title and ending with a source note, if any. The following sections deal with each part in turn.
7.6.1 Table number

Tables are numbered because it is not always possible to place a table next to its mention in the text: the mention may fall near the end of a page; a table may be large enough to fill a whole page; several tables may be mentioned within a single sentence or a single paragraph; and so on. All tables within a single volume may be numbered in one sequence or the numbering may begin afresh for each chapter (Table 8.2 for the second table in Chapter 8 and so on). Such double numeration is common in volumes in which different authors contribute difference chapters.

The word Table, which precedes the number, may be capitalized differently (TABLE, TABLE, or Table) and styled differently (normal, bold, italics, etc.). Make sure that the format is consistently followed for all tables. The number that follows may also be set in bold although it is a good practice to use bold only for the number and not for the preceding word so that the number stands out.

Note the punctuation between the table number and the table title: it could be a colon or a full stop or only space. The title may follow the number on the same line or may start a fresh line.

7.6.2 Table title

The title of a table should capture its essence and help readers to place the numbers that follow in context, telling them the topic (the subject) and the kind of information given about the topic (complement or predicate), as in ‘Literacy (%) in India in 2001, by state’ or ‘Daily per capita availability of water (litres), by country (1971–2001)’. If all values in a table are in a common unit of measurement, the unit should form part of the table title. Also, if the data refer to a particular year or range of years, it should be mentioned.

The title may be printed in lowercase letters, that is in sentence-style capitalization (Only the first word and proper nouns if any begin with a capital letter) or in title case (All Significant Words Capitalized) or set ENTIRELY IN CAPITAL LETTERS.

Typically, table titles are not complete sentences and therefore do not end in a full stop. However, if a title is given as a complete sentence (a style common in management reports but rare in scientific texts), a full stop is required (as in ‘Sales peaked in March.’)

If a title is longer than a line, the second and subsequent lines may or may not be indented; again, the editor should make this consistent.

7.6.3 Column headings and alignment

A table is essentially a matrix or an array of rows and columns. Row headings are placed to the left, at the beginning of each row; column heads are placed at the top, at the head of each column. If different columns in a table use different units of measurement (literacy given as a percentage, life expectancy in years, weight at birth in kilograms, and so on), the unit for each column is part of the column head, typically separated with a comma, as in ‘Weight at birth, kg’. Since the heading applies to each row in turn, the heading normally takes the singular form (Year or City or Height or whatever and not Years or Cities or Heights). If you see a term repeated in every row, check whether it could be made part of the column head: for instance, if every number in a column is followed by the per cent sign (%), make it part of the column heading (Literacy, %) and remove it from each row.

If a column heading has subheadings, the subheadings are typically indicated with a 'spanner' rule or a 'straddle' rule that appears below the main heading and above the subheadings, extended across all the subheads.
If column headings occupy more than a line, ‘stack’ them, that is see that they all align at the bottom so that there is no gap between the column head and the body of the column.

All values within a column are aligned one below the other but the form of vertical alignment varies. If all values within a column share a common unit, see that they are right-aligned (units line up with units, tens with tens, hundreds with hundreds, and so on). If the values are expressed in decimal fractions, align the values by the decimal point.

If the column head indicates a category (city, plant species, and so on) instead of a quantitative variable (weight, kg or height, cm, etc.), and the unit of measurement is indicated in the row heading – one row for the area (square kilometers) of the city, another for its population (millions), another for length of the road network (km) and so on – it makes no sense to line up units below units, tens below tens, etc. because each number represents a different quantity. Therefore, in such cases, choose left alignment to reinforce the point that the numbers in a column do not share any arithmetical relationship.

Thus you may choose right-, decimal-, or left-alignment for aligning numbers in a column as appropriate—never use the centred alignment.

### 7.6.4 Row headings

Almost everything discussed above about column headings applies to row headings too, except that subheadings within a row heading are typically marked by indents: the row head is placed flush with the left edge but subheads begin underneath and a bit to the right. All the row heads together are sometimes referred to as the ‘stub’.

If a row heading runs longer than a line, align the rest of the row with the last line of the row heading so that readers can continue reading across as they finish reading the row heading. However, if table cells contain text instead of numbers, align the row heading and rest of the cells in that row from top.

### 7.6.5 Cells with missing values

Avoid empty cells: readers will wonder whether the cells are empty for a reason or they are only an oversight. Avoid ambiguous abbreviations; n.a., for example, may mean ‘not available’ or ‘not applicable’. Adopt a consistent notation to indicate whether the value for an empty cell was not available or not applicable.

### 7.6.6 Footnotes

Table footnotes appear at the foot of the table and not at the foot of the page on which the table is printed. For tables of numbers, use letters of the alphabet as footnote markers. Assign footnote markers in the normal reading sequence: from left to right as you move from top downwards.

### 7.6.7 Source notes

If a table does not indicate a source, the table is attributed to the author. It is essential not only to mention the source if the table is reproduced from another publication but also to obtain permission of whosoever holds the copyright to that publication: the copyright is usually held by the author but sometimes publishers retain the copyright. In these cases, the standard phrase is ‘Reproduced with permission’. It may also happen that a table contains both original and borrowed data. If so, the standard phrase is ‘Adapted from’.
7.6.8 Editing tables

As an editor, you should spot-check each table. Try and construct a ‘test sentence’ by reading across the table: for example, for a table that gives statistical information about different cities with a column for each parameter (area, population, length of the road network, income per capita, and so on), a test sentence will read ‘The average per capita income in Chennai is Rs 15 000’. If you find it difficult to construct a meaningful test sentence, trace the source of the difficulty (missing units, for instance) and fix it or check with the author.

Check that rows and columns are ordered in a logical sequence: alphabetical, in descending or ascending order of magnitude, by location, by date, and so on. Sometimes authors present data in the same order in which they were collected, which is a poor basis for organizing data.

If a table is too wide or too long to fit on a printed page, consider revising the table. If a table has few columns but many rows, it could be ‘doubled up’, that is the set of columns is repeated and the two sets printed side by side. Check whether the table can fit by ‘pivoting’ it, that is by turning the rows into columns and columns into rows.

As far as possible, see that the columns are fairly close together: it is not necessary to force a narrow table to fill the available width by forcing the columns wider apart; wide gaps between columns in fact make it difficult to read a table across the columns.

If a table extends to more than a page, insert appropriate text to indicate that the table is continued on another page.

7.7 GRAPHS

Graphs are pictures of numbers and can communicate trends or patterns at a glance. The terms charts and graphs are generally used as synonyms, as in this unit, although graphs can be regarded as a subset of charts in which values of variables are ‘plotted’ or ‘graphed’ against each other (a graph showing hourly temperature over 24 hours, for example, or one showing average life expectancy from, say, 1901 to 2001).

7.7.1 Types of graphs

The three most common types of graphs are line, bar, and pie. Each serves a different purpose, that is each is used to show a different type of relationship between sets of numbers. Line charts typically show how a quantity varies with time (the examples above), bar charts show how different categories compare with one another (average per capita consumption of electricity in different countries or average monthly earnings of members of different professions), and pie charts show how different parts make up the whole (the proportions of children, young adults, and the elderly in India’s total population or of different kinds of vehicles in the total number of vehicles plying on a city’s roads).

As an editor, you should check whether the type of chart is chosen appropriately. In pie charts, the total should be a meaningful and definable quantity—it does not make sense in the example given above to use a pie chart to compare monthly earnings because total earnings by members of different professions is not a finite quantity.
7.7.2 Parts of a graph

Every graph consists of different parts: line charts have at least two axes, bar charts have one axis, and pie charts have none but may have lines that connect each sector of the pie to its label. Subdivisions of an axis are marked by ticks.

Different categories, which are represented by lines, bars, or sectors, also have labels. Besides, the graph as a whole will have its title or caption.

7.7.3 Scales

Graphs are invariably drawn to scale. In a line chart showing hourly temperature, the vertical axis, also called the Y axis, will show the temperature and the horizontal axis, also called the X axis, will show hours of the day. Appropriate scales are chosen depending on the difference between the highest value and the lowest value and available space. If the differences are huge (monthly incomes, for instance), a logarithmic scale is often used. If not, tick marks along the axis should be equidistant. The zero point should also be marked as appropriate.

7.8 CHARTS, DIAGRAMS, MAPS, ETC.

Scientific text often requires diagrams that illustrate different concepts, processes, or objects. A flow chart, for example, shows all the steps in a process (how sugarcane juice is converted into granular sugar or how an e-mail message travels from the sender to the receiver). A diagram of a camera, for example, shows the different parts of a camera and a diagram of the digestive system shows the different organs involved in the process of digestion.

Maps are representations of locations and spaces. A map showing the railway network of India, for example, will show the locations of all railway lines whereas a map showing India’s rivers will show all rivers and their origin and tributaries. With maps, it is essential that the scale and points of compass, usually the north, are shown.

As an editor, you should be careful to ensure that the boundaries as shown in any map of India are those recognized by the Government of India. Similarly, make sure to include all the offshore islands when the map is labeled as that of India as a whole.

7.9 PHOTOGRAPHS

For readers, photographs – especially colour photographs – have a far stronger appeal than text or other kinds of illustrations; for the editor, photographs mean venturing beyond spelling, grammar, and punctuation into pre-press and production. (Pre-press covers all activities related to getting stuff ready for printing once it has been carefully edited and proof-read.)

Digital cameras and electronic publishing have made it far easier to incorporate photographs into documents that will not be printed at all but read only off computer monitors—it is only when photographs have to be printed that they can cause a number of technical problems.

However, before considering the technical aspects such as resolution and file formats, it is important to deal with editorial aspects of photographs, which include relevance, scale, permissions, captions, and positioning on the page.
7.9.1 Relevance

Although the cliché that a picture is worth a thousand words is by and large true, it assumes that the picture is relevant and well-chosen. Photographs can enliven a document but, at least in technical and scientific documents, should do more than that—they should fulfil a need that cannot be met otherwise.

Photographs can convey reality better than drawings. Photos of insects, animals, flowers, and fruit are essential in biological texts. Close-up photos showing various symptoms or effects are likewise essential in medical texts. With photos of people, it is better to use ‘action’ photos—photos that show people doing something—rather than ‘mug shots’ (such as those typically used for identification, as in passports or identity cards).

7.9.2 Scale

Photographs must include some indication of scale. Imagine photographs of a watermelon and an Indian gooseberry (amlax, or Phyllanthus emblica) without any indication of scale: for those who have never seen either, the photos can prove misleading but a picture showing a gooseberry resting on an open palm will at once convey some idea of actual size of the fruit. With photomicrographs (those showing microscopic objects), it is essential to include a scale in the photograph alongside the objects and to state the magnification in the caption.

7.9.3 Permissions and releases

Photos are as much subject to copyright as text, and it is essential to obtain prior permission before including a photo in a publication—the fact that the photo appears on a web page does not mean that permission is not necessary: the photo is put on the web page for viewing, not for incorporating into another publication, electronic or otherwise. As an editor, you should ask the author about the source of each photo and proceed accordingly.

In photos of people in which they can be identified, it is necessary to obtain their permission (normally termed a ‘release’). This is the reason why photos showing faces of people are deliberately shown blurred or with part of the face masked, especially in medical publications.

7.9.4 Captions

Captions supplement photos and other forms of illustrations by supplying appropriate textual information about their contents. Note that captions are always placed below the illustrations whereas titles of tables are placed above them. As with tables, figures are numbered (either consecutively within a document or within a chapter or a paper) for identification and for referring to them within text. Style for captions covers such elements as positioning (centred on the width of the illustration or left-aligned), case (sentence case or titles case), posture (italics or normal), and end punctuation. Incidentally, if the style is to set all captions in italics, text normally set in italics (botanical names, for example) is set in normal font when it occurs as part of an italicized caption. Captions should not state the obvious (what is evident in the photo) but add useful supplementary information, such as location or date, as appropriate.

7.9.5 Positioning photos on a page

In printed documents or documents designed as printed documents, photos placed in the top half or on the outside half (to the left for a left-hand page and to the right
for a right-hand page) command greater attention. If a figure is large enough to nearly fill a page, it is best not to include any text other than caption on that page. It is also customary for such a page not to carry the page header or footer or the page number.

Make sure that photos are placed the right way around and not upside down: when the right way is not immediately obvious (photo of a lake with the sky above, for instance), write very lightly at the back of the photo something like ‘This way up’ or draw an arrow to show the right way up.

It is also customary to place photos of people in such a way that they are seen ‘looking into the page’ rather than away from it; in other words, if a face is shown in profile such that the nose is to the right, the photo is placed on a left-hand page—the person in the photo is then seen as looking into the document rather than away from it. Similarly, in showing photos of audiences, it is best to avoid a sea of heads, all with their backs to the reader.

### 7.10 FILE FORMATS AND RESOLUTION

With easy availability of digital cameras and scanners, and images plucked from the Web, it is more common for authors to supply photos in a digital format (as ‘soft copies’) instead of as prints. The quality of the photo — or even whether the file can open at all to reveal the picture — is thus not immediately obvious. As mentioned earlier, it helps to make a logbook to keep track of all photos: filename and extension, file size and date, dimensions (in pixels or in absolute units), and so on. In the following sections, some common file formats are discussed briefly. In general, remember that file size and image quality are inversely proportional.

#### 7.10.1 JPEG files

The most common format for digital photos is the so-called JPEG (joint photographers expert group) format, indicated with the file extension *.jpg. Unfortunately, it is the least suitable for printing on paper for the simple reason that the format is essentially meant for images to be viewed on the screen: the resolution (sharpness) is low but files are small and can be easily downloaded or sent as attachments to e-mails. Explain this to the author and discuss alternatives. One way out is to see if the photo can be printed smaller than the original size because reduction can, to some extent, compensate for poor resolution.

#### 7.10.2 GIF files

Whereas colour photos, with many shades of different colours, are captured in JPEG format, charts, drawings, even text, are captured in GIF format (graphics interchange format). Again, it is best to discuss alternatives because these too are less suitable for printing on paper.

#### 7.10.3 TIFF files

The format preferred by most print professionals is TIFF (tagged image file format) because it can print photographs very well. All the data originally captured by the camera are preserved but it also means that files are large. It is best to suggest to authors that any pictures intended for printing on paper should be taken and stored as files in TIFF.

#### 7.10.4 RGB and CMYK

The two abbreviations you will frequently encounter in any discussion of colour
printing are RGB (red, green, blue) and CMYK (cyan, magenta, yellow, key or black). Although the physics of colour are beyond the scope of this unit, it is helpful to remember two points: (1) RGB is used for photos meant for the screen whereas CMYK is used for photos to be printed on paper and (2) the two systems are only roughly equivalent: it is impossible for photos printed on paper to match the appearance of their screen versions. Also remember that in printing on paper, each of the four colours that make up CMYK is printed in separate passes: first, only the yellow component is printed; the same sheet is then fed again and the cyan component printed on top of it; the sheet is fed the third time around and acquires magenta; and finally black is added to give depth to the picture and to print text, if any.

7.10.5 Resolution

Resolution is a measure of how sharp an image looks. Screen images are typically 96 dpi (dots per inch, which means that if 96 dots are placed side by side in a row, that row will be an inch long). For good-quality printing of photos, a resolution of 150 to 300 dpi is required and for charts, diagrams, etc., the resolution should be at least 600 dpi. Be aware that the higher the resolution, the larger the file, although higher resolution does not automatically mean better images.

7.11 SUMMARY

Editing text demands a good grasp of grammar, spelling, and punctuation, and editing tables calls for a good grasp of numbers, or numeracy as it is known— editing figures takes a lot more. However, figures are essential to most scientific text and good editors learn take figures in their stride. You may be dazzled by the numerous technicalities involved in handling images, but focus instead on communication: Are images necessary? Are they relevant? Do they convey a clear message? Do they match the text? Above all, do not take a 'hands off' attitude to tables and figures—edit them as hard as you would edit words.

7.12 FURTHER READING AND RESOURCES

7.12.1 Books


Williams R and Cohen S. 1999 The Non-Designer's Scan and Print Book: all you need to know about production and prepress to get great-looking pages Berkeley, California: Peachpit Press. 264 pp.
7.12.2 Electronic sources

Professor Edward Tufte, who wrote one of the books mentioned above, has a website devoted to visual representation of numbers, concepts, and facts. <http://www.edwardtufte.com/tufte/index>

Pictures of numbers is an interesting website maintained by Dr Mike Dickison, who illustrates with a number of examples how charts can be made more informative, useful, and attractive <http://www.numberpix.com/>.

Jean-luc Doumont’s Principiae: structuring thoughts is particularly helpful in developing a logical approach to structuring information through words as well as through charts and tables. <http://www.principiae.be/in>