Effective Lecture Slides and Overhead Transparencies

P. R. Haddad

(Chemistry Department, School of General Studies,
A N.U. P.O. Box 4, Canberra, A.C.T. 2600)

Almost every speaker at RACI conferences uses slides or overhead transparencies to illustrate topics and to emphasize important points. All too often, however, these visual aids fail to achieve their desired purpose because they are illegible or too complex for easy assimilation by the audience. Such visual 'aids' annoy the viewers, devalue the information presented, and are therefore a waste of production effort.

Three main factors contribute to the effectiveness of a slide or overhead transparency (OHT): legibility, format and colour. Of these, legibility is the most important single factor but unfortunately it is also the factor most often overlooked in the preparation of visual aids. For example, a sheet of typewritten paper which is easily legible when read normally will almost invariably be illegible when projected as a conference slide. This can readily be demonstrated by comparison of the page size and normal reading distance with the screen size and the distance to the back row in a lecture theatre. Thus a regular A4 page (30 cm × 20 cm) of typewriting read from the normal reading distance of 30–45 cm is quite legible, but the same page projected on to a 3 × 2 m screen is only legible from distances of about 4 m or less. Many lecture theatres have the back rows of seats situated up to 20–25 m from the screen: the inadequacy of the above slide is readily apparent.

The generally accepted maximum viewing distance for most practical requirements is 8 times the height of the projected image—the so-called 8H rule[1]. Thus a projected image 3 m high should have lettering of sufficient size to be legible from 24 m to a person of slightly below average eyesight. Clearly, if this condition applies, then legibility from distances less than 24 m is assured.

This paper attempts to provide clear guidelines for the dimensions of letters, diagrams etc. which comply with the 8H rule so that when prepared as slides or OHTs, they should be legible under most practical conditions. The suggested dimensions are the *minimum* required and it is advisable, where possible, to exceed these sizes (by as much as a factor of 2) to allow for lecture theatres with small projection screens, bad light exclusion or poor projectors. Slides and OHTs will be discussed separately under the general headings of legibility, format and colour.

SLIDES

Legibility. The most convenient and rapid manner to prepare an original document for slide production is by using a typewriter. In doing this, however, the lettering size is fixed to within narrow limits (depending on which typeface is used), so the available area for typing must be reduced for the ratio of letter size to page area to comply with the 8H rule. Kodak[2] recommend a typing area of 11.5 × 7.5 cm (Fig. 1). Note that the width and height of the diagram are in the same ratio as that used for regular 35 mm slides, *i.e.* 3:2. An A4 page divided into quarters gives an area similar to that of Fig. 1 and provides a useful template for typing.

The guidelines given below should be followed when typing the original lettering into the Fig. 1 template.

(a) All typing should be kept within the template and a clear 1 cm border should be left around the exterior of the template.

(b) Where possible, a 10 pitch typewriter should be used with a maximum of 43 characters (including spaces) to the line.

(c) No more than 8 double-spaced lines should be included.

(d) Capitals can be used to emphasize key words, but exclusive use of capitals for the entire text is undesirable because the resultant type has no height variation and is difficult to read[3].

(e) A piece of reversed carbon paper provides a useful backing during typing since the type produced is darker and can be more easily photographed.

A document prepared according to these guidelines will result in a slide which is legible under most conditions. Larger typefaces (such as IBM Orator) can improve the legibility even further. When the slide is completed, a final legibility check is to see if it can be read from a distance of 20 cm with the naked eye; if so, then it satisfies the 8H rule.

Diagrams can be prepared in a similar manner to that above by using the Fig. 1 template to define the size of the original. Titles, labels for axes and any other lettering can then be added with a typewriter. If this method is to be used, line widths for all artwork on the diagram should exceed 0.6 mm.

A more common procedure is to draw the diagram on a fairly large sheet of paper and to prepare a slide from this original. It is advisable to use a standard size template for all diagrams so that lettering and line widths can also be standardized. A good standard template

Paul Haddad graduated from the Royal Military College, Duntroon, in 1969 with a Diploma of Military Studies. He then attended the University of New South Wales and gained BSc (Hons) in 1971 and PhD in 1975. His PhD programme was in analytical chemistry and involved a study of the application of ternary complexes to spectrofluorometric analysis.

He resigned from the army to take up an appointment as senior tutor at ANU in 1975. His interests include trace metal analysis and chemical education in the laboratory.
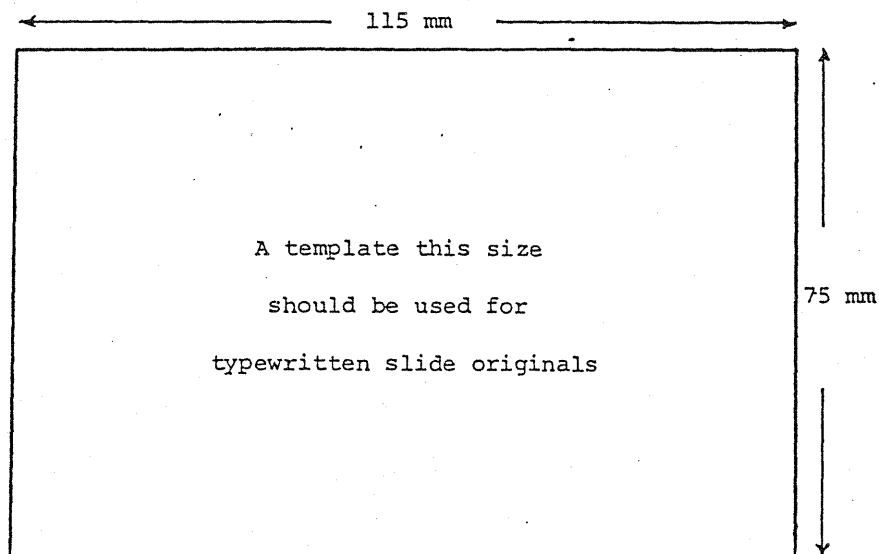
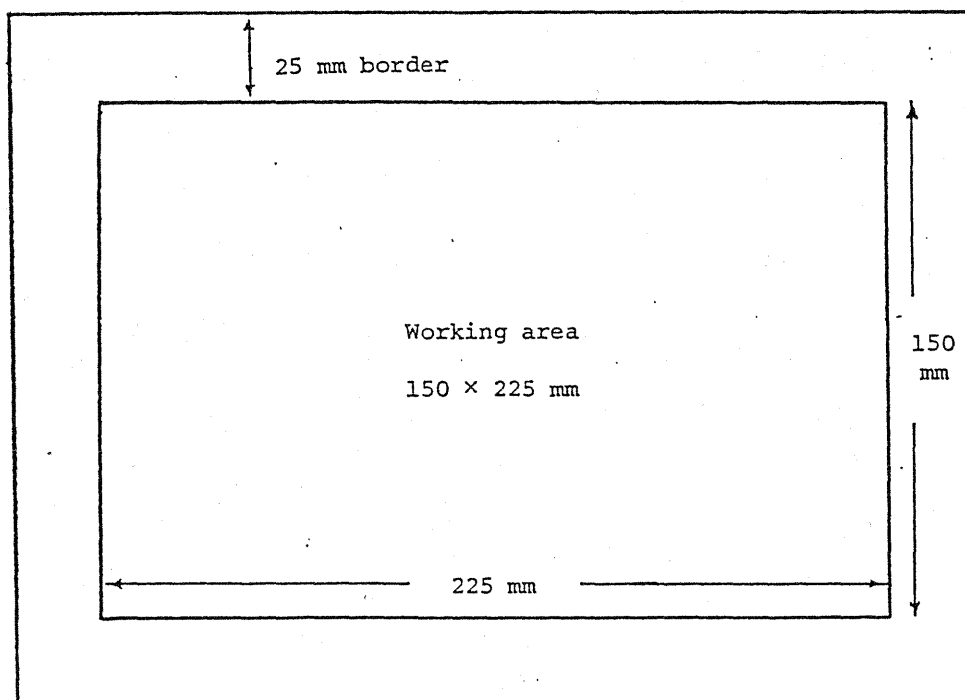*Fig. 1*—Template for typewritten slide originals.

Fig. 2—Template for preparation of diagrams for slide production.

is 150 × 225 mm (6 × 9 in.) with a clear margin of 25 mm (1″) around the borders (Fig. 2)[4]. Table 1 gives an indication of the minimum lettering and line dimensions to be used on this standard template.

Included in Table 1 is the equivalent 'Letraset' dry transfer lettering which satisfies the dimension requirements. The *Helvetica* range has been selected because of the wide diversity of symbols etc available within this range. The slightly more compact lettering in the *Helvetica Light Condensed* range is also useful for preparation of slides, provided the correct letter sizes are used, as indicated by the point values given above.

Under some circumstances, the standard size diagram template will not be the most desirable and larger templates must be used. The minimum letter and line dimensions can be obtained by consulting the legibility calculator included in Kodak pamphlet S 24[4].

Format

The keynote for slide design is simplicity, and attention to this aspect, together with a regard for common-sense and consideration for the audience, will result in effective slides.

Table 1. Suggested minimum dimensions of line work and lettering for preparation of diagrams on a 150 × 225 mm template to ensure adequate slide legibility.

Description	Letter Height[a] (mm)	Line Width (mm)	Letraset equivalent
Title	7	1.0	Helvetica Light, 36pt,[b] Sheets 3021,2
Labels for axes.	6	0.8	Helvetica Light, 28pt, Sheets 3023,4;
Other lettering	5	0.7	Helvetica Light, 24pt, Sheets 3025,6
Axes	—	0.6	—
Graphs	—	1.4	—
Data points (on graph)	4	—	Key symbols, Sheet 2453

a. As measured from the lower case letter x.

b. The point value indicates the height of the letters.

Table 2. Suggested minimum dimensions of line work and lettering for preparation of OHTs using a 150 × 225 mm template.

Description	Letter height[a] (mm)	Line width (mm)	Letraset equivalent
Title	7	2	Helvetica Medium, 36pt,[b] Sheets 3011,2
Text	6	1.2	Helvetica Medium, 28pt, Sheets 3013,4
Labels for axes	6	1.2	Helvetica Medium, 28pt, Sheets 3013,4
Lettering on graphs	5	1.0	Helvetica Medium, 24pt, Sheets 3015,6
Axes	—	0.6	—
Graphs	—	1.5	—
Data points on graphs	4	—	Key Symbols, Sheet 2453

a. As measured from the lower case letter x.

b. The point value indicates the height of the letters.

It is not necessary to repeat in a slide information which is to be presented orally—rather a list of key words with only minor detail will serve to keep the thread of the speaker's comments. Slides should be restricted to only one or two main ideas and in this regard, the small size of the standard typing template serves as a means of disciplining the content of a slide.

Tables of figures are difficult to assimilate and for this reason large tables should be broken down into smaller ones where possible. Most tables presented in books and papers contain too much material for slide originals and need to be modified before use. An example of such a modification is the conversion of the tabulated material into a bar graph or some other simple diagram. Diagrams should also be kept simple and graphs containing many overlapping lines with a multitude of data points are clearly unsuitable for slide production.

Consistency of format, such as keeping all slides in the horizontal rather than vertical mode, aids in audience interpretation and avoids the delay of forcing the audience to readjust constantly between horizontal and vertical projections. On this aspect, it is notable that projection difficulties (such as the image exceeding the screen size) occur most fre-

quently with vertically projected slides.

Colour

Conventional black and white slides are tiring to view because of the glare of the white background and also they mark easily with dust and fingerprints. Colour slides are easier to view and the colour can be used to highlight points, distinguish graphs and data points and also to reduce glare.

Several rapid and inexpensive methods exist for the introduction of colour into slides[5]. The simple device of colouring directly on to negatives with texta colours, transparency marking pens or adhesive colour film (available from Letraset) results in a slide with coloured writing on a dark background. Selective colouring can be used to highlight certain points. Slides with white writing on a uniform colour background can be obtained quickly and easily using the ammonia processed Tecnifax Diazochrome film sheets. A wide variety of colours is available and these slides have the advantage of improved legibility in only partially darkened rooms. This removes the necessity for constant operation of the room lights.

The use of colour film greatly expands the range of possibilities for

colour in slides, but best results are obtained only by professionals. Consultation with photographers often results in the emergence of ideas which can readily be incorporated into slide production.

General

Where possible, it is strongly advisable to have slides fixed into glass mounts since these prevent distortion of the film by the heat of the projector lamp. Slides mounted in glass can be used many times and can be projected for long periods without detriment; in contrast, slides without glass mounts frequently become unfocussable after only limited use.

Correct marking and numbering of slides is essential to ensure correct orientation when projected and it is good practice to run the slides through the projector prior to the talk. Any special instructions regarding projection can be given to the projectionist at this time.

Different groups or sequences of slides may be conveniently separated with a 'black' slide made simply from a sheet of cardboard. This avoids the distraction of an empty glaring screen.

OVERHEAD TRANSPARENCIES

OHTs have one main advantage over slides and this is that they do not require specialist photographic services for production. Many of the comments made previously in the discussion of slides are equally pertinent to OHTs. The same 8H rule applies, but additional complications for OHTs are that the screen used is often smaller than a slide screen and the lamp intensity of the projector can be less than slide projector lamps. The suggested dimensions below comply with the 8H rule and include an additional allowance for the abovementioned factors.

Legibility

Regular blank acetate sheets for transparencies measure roughly 21 × 26 cm and are projected on to a screen usually 2–3m high. Peripheral projection is sometimes distorted in overhead projectors, so it is best to keep most work well within the borders of the sheet. A standard working area of 150 × 225 mm (6 × 9 in.) with a clear border of 25 mm (1 in.) is the best

sized template to use. Table 2 lists the suggested minimum lettering sizes and line dimensions to be used on this standard template.

Transparencies may be prepared by hand, using any of the wide variety of marking pens, but legibility and appearance are improved when stencils or dry transfer letters (such as Letraset) are used. The Letraset typefaces and sizes suitable for OHT preparation are shown in Table 2. Once again, the more compact *Helvetica Medium Condensed* range can be used if desired, provided the correct point sizes shown in Table 2 are employed.

Standardization of the template area is again strongly advisable because lettering and line sizes can be standardized thereby simplifying ordering of materials. A useful rule of thumb for assessing the likely legibility of an OHT is "if the line work and lettering look too big with the naked eye, then the transparency will be the correct size when projected". Conversely the impression "if it looks about right, it will be too small when projected" is equally valid.

Transparencies may be made from opaque original sheets using heat sensitive machines such as *Thermofax* copiers. Such machines are often misused for the preparation of OHTs directly from books and typewritten material. An appreciation of the earlier remarks on legibility and the 8H rule quickly shows that OHTs prepared in this way are normally useful only for very small rooms where the audience is close to the screen. In view of this, direct copying of books and typewritten material is generally useless

for conferences, but the copying machines are valuable for the duplication of fragile original OHTs.

Format

The same guidelines given earlier for the preparation of slides apply equally well for OHTs. Simplicity is vital and only one or two main points should be included in each transparency. If the content is restricted to a maximum of seven lines of well spaced writing or to a simple, uncluttered diagram, then the OHT is likely to be effective.

Transparencies lend themselves to masking techniques, where selected areas are covered until an appropriate time. This helps to keep the attention of the audience focussed on the relevant area of an OHT while it is discussed. In addition, overlays may be used to build a simple foundation OHT into a relatively complex one which could not be easily assimilated if initially projected in its final form.

Colour

Unlike slides, the introduction of colour into OHTs is a simple procedure, since no special processes are required.

Colour transparency marking pens are available but the lighter pastel colours have diminished legibility and should be used with discretion. Coloured backgrounds can be made using coloured base sheets of acetate or by copying on to coloured material with *Thermofax* copiers. Alternatively, selected large areas of a transparency can be coloured with adhesive colour sheet, while smaller areas or even individual letters can be coloured using the Letraset *Letracolor* range of tapes, sheets and letters.

General

As with slides, the mounting of OHTs is important. The use of a cardboard frame prevents curling of the transparency, makes it easier to handle when placing it on the projector and also facilitates storage. These frames are essential if overlay techniques are to be used.

Conclusion

Time spent planning and preparing originals for slides and OHTs will result in the production of effective material, provided the guidelines set out in this paper are followed. Attention to detail and consideration for the audience will result in the eradication of the necessity for damning introductory remarks such as "you probably can't read this slide, but . . .", "this diagram is somewhat confusing, but . . ." and "if this slide could be focussed better, you would see that . . ." etc.

References

The author gratefully acknowledges the expert advice and assistance given by Bob Dowhy (Photographer, Chemistry Department. ANU) and by Darien Rossiter and Jill Ruse (both of the Instructional Resources Unit, ANU).

Acknowledgements

1. Kodak "Tech Bits", 1975, 3, 4-8.
2. Kodak Pamphlet S22, "Effective Lecture Slides".
3. I. Townsend, *Visual Education*, March 1976, p.23.
4. Kodak Pamphlet S24, "Legibility—Artwork to Screen".
5. Kodak Pamphlet S13, "Materials for Visual Presentations".
Note: The above Kodak publications, together with several others on visual aid production, are available free of charge from Kodak (Australasia) Pty Ltd.

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From time to time the Institute is invited to be represented at meetings of overseas chemical societies and institutions. It is not always feasible for people to be sent, specifically, to many of these meetings, because of the high cost of the travel involved. In such cases, the Institute tries to use the services of members who are already in the area on company business, study leave or holiday, etc. The Institute now invites members who are intending to travel overseas to contact Headquarters, if they feel they would like to help the Institute in this way. Details supplied should include the anticipated itinerary, with appropriate dates.

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At the business meeting held during the recent conference in Adelaide, a new committee was elected for the Chemical Education Division. This is: J. R. McKellar *(F)*, Chairman; E. C. M. Grigg *(F)*, Past Chairman; C. L. Fogliani *(A)*, Honorary Secretary/Treasurer; R. Clark *(A)*, J. M. Davis *(A)*, J. B. Endacott *(A)*, B. D. James *(A)*, D. E. Mulcahy *(A)*, G. Wills-Johnson *(A)*, Honorary Editor; J. Devenport *(A)*, F. C. James *(F)*.. *Division Secretary:* C. L. Fogliani *(A)*, 16 Isaacs Street, Bathurst, NSW, 2795.

Broken Hill Section

Mr Rex Cederblad *(A)* has taken over as Chairman of the Broken Hill Section of the Institute, following the resignation of Associate-professor K. J. O'Brien *(F)* through ill-health.