

Reading, writing and drawing in relief : the IPO relief-drawing set

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Reading, Writing and Drawing in Relief: The IPO Relief-Drawing Set

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Abstract: Describes an improved relief-drawing set that allows durable, tangible, and visible embossed images to be made with a ball-point pen.

Reading, writing, and drawing are essential means of human communication. They help us to obtain and shape our ideas, to describe them to others, and to remember the relevant aspects later. The drawing set described in this paper is intended to assist visually handicapped persons in these aspects of visual and cognitive functioning.

By drawing or writing with a certain amount of pressure, e.g., by means of an ordinary ball-point pen, the relief-drawing set makes it possible to produce durable embossed representations that are immediately tangible and visible on the writing side of the special plastic drawing sheets (see Fig. 1).

One of the earlier relief-drawing methods consisted of drawing on paper positioned over a sheet of fine wire gauze (see Fig. 2). A drawback of this method was that the relief came up at the reverse side of the paper, so that the images could be felt only after completion. Moreover, the relief pictures were mirror-images of the drawings.

An obvious improvement was obtained by drawing on cellophane with a rubber layer underneath (see Fig. 2). The rubber made the cellophane rib slightly upwards under the pen, so that the drawing could be felt immediately—not as a mirror image. However, the embossing was not very deep and the smooth surface of the material stuck to the fingers, especially when the skin was

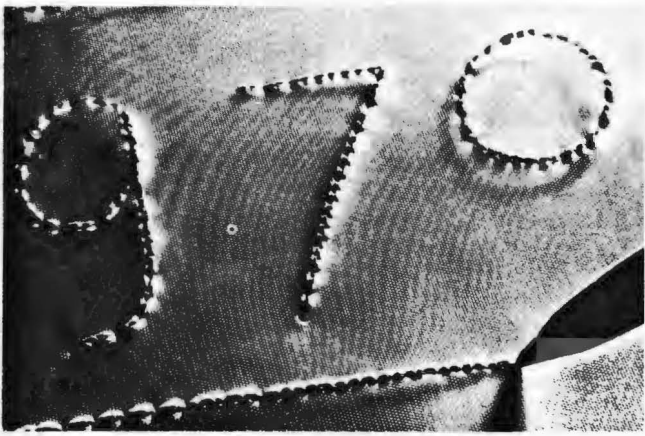


Figure 1. Drawing is immediately tangible and visible on writing side of the special plastic drawing sheets. The fine texture makes it easier to feel and handle.

The technique is certainly not new; some 15 years ago, the American Foundation for the Blind catalog included a "Raised Line Drawing Kit." However, an improved relief-drawing set has now been developed at the Institute for Perception Research (IPO) in Eindhoven, the Netherlands. By means of practical tests, close attention was paid to the human factors aspects of the set: The tests were performed in close cooperation with the Dutch institutes for the visually handicapped. Financial support for the production of the final design was provided by the Dutch Association of the Blind [Vereniging het Nederlandse Blindenwezen (VNBW)], which also undertook distribution of the set.

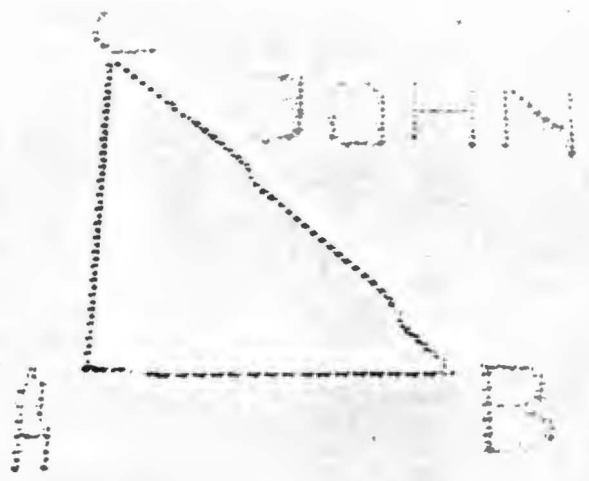


Figure 2. Earlier relief-drawing method. *Upper:* Drawing on paper placed over fine wire gauze yielded mirror-images. *Lower:* Drawing on cellophane with a rubber layer underneath; the images could be felt on the written side, but the material stuck to the fingers.

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moist. These characteristics were annoying and hampered accurate sensing.

In 1970, an improved relief-drawing material was discovered by research workers of the Institute for Perception Research (Engel & van den Ban, 1970). The material was plastic, and due to its fine texture (see Fig. 1) it did not stick to the fingers. Moreover, it produced a deeper relief-effect and the stiffness of the sheets felt more like regular paper. At about the same time, Ruth Barr (1970) announced a new relief-paper in the USA. As regards the characteristics mentioned above, the IPO material was found to be superior.

Largely due to the activities of Friar Slegers of the "Henricus" Institute for the Blind in Nijmegen, the Dutch drawing sheets soon became quite popular. Stimulated by the enthusiasm of the users, a simple matching drawing board was made by the IPO, making use of an older design for cellophane paper. Field trials in close cooperation with the Dutch Institutes for the Blind finally resulted in the manufacture of complete drawing sets (Bouma, Engel, & Melotte, 1972). A first series of these sets was manufactured by students of the school of technology in Eindhoven, while a second series was made by a union of retired workers named "Sterk door Werk" (Strength through Work).

However, the design had to be suitable for the limited facilities of these small production units, and proved too laborious for the increasing quantities required. It was decided, therefore, to develop a new set based on a cast-moulding technique. With financial support from the Dutch Association of the Blind, this set (see Fig. 3) is now available.



Figure 3. The new, improved IPO relief-drawing set.

Component Parts

The relief-drawing set consists of the following component parts (see Fig. 4):

- A rubber-covered drawing board, provided with magnetic clamps (4 and 10) and tactile centimeter divisions (3) along the guide slots (1 and 17). These divisions can be traced with the tip of the ball-point, for instance. The longer grooves (12 and 18) indicate the 10 cm [2.54 in.] divisions. The rubber layer (7) underneath the drawing sheet causes the plastic material, embossed by writing with the ball-point, to be raised up (Fig. 1). The image produced in this way

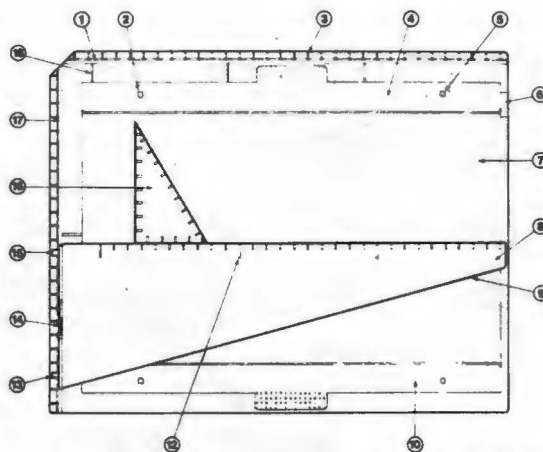


Figure 4. Outline of the new drawing set. The circled numbers refer to the text.

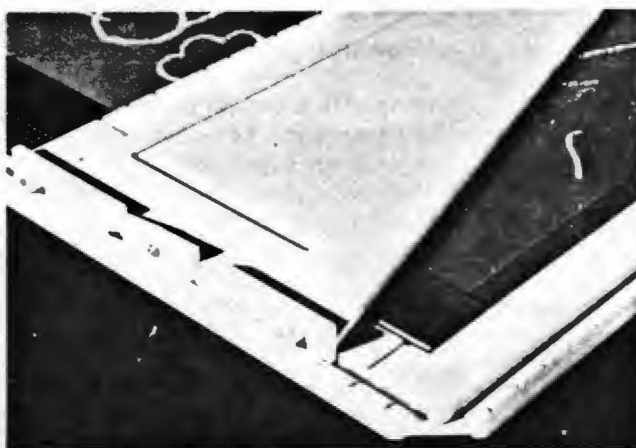


Figure 5. Detail of the drawing board and T-square, both provided with tactile centimeter divisions. When the T-square is moved along the divisions they are tangible as well as audible.

is immediately tangible at the working side of the sheets.

- A T-square (8) with blocking facility and centimeter-stops, together with a 30/60° triangle (16), both with tactile centimeter divisions. To draw interrupted straight lines along these divisions, the ball-point has to be kept aslant; for non-interrupted lines the pen has to be kept perpendicular to the drawing board. Two small plugs (13 and 15) alongside the T-square, in combination with the centimeter grooves in the drawing board, provide a centimeter stop facility, while a rotating catch (14) takes care of the blocking facility (see also Fig. 5).

The stops (2, 5, and 6) help during sheet insertion, while the raised stop (6) also functions as a zero point for the T-square. The oblique side (9) of the T-square makes a 15° angle with one of the perpendicular sides, so that 45° angles and 15° divisions can also be obtained in combination with the 30/60° triangle (16).

- A quantity of A4-standard size (21 x 29.7 cm) [5.47 x 7.62 in.] drawing sheets, provided with a fine texture

(see Fig. 1) for improved tactile sensation. This texture prevents the sheets from sticking to the fingers while scanning the embossed images. Moreover, the texture increases the relief characteristics of the sheets and also stiffens them, so that the sheets are more like paper. The drawing sheets are used with the smooth side down, thus reducing the friction with the rubber layer during insertion of the sheets under the magnetic clamps.

- A plastic case containing the drawing materials. Three fly-leaves are inserted to protect and separate used and unused drawing sheets. Completed drawing sheets can be stored in the relief-drawing case as well as in other regularly available A4-writing files.

Applications

The relief-drawing set has applications in various fields of daily life, for example:

As an educational aid, e.g., for geometry, mechanics, geography.

As an aid for teaching the early blind to write (e.g., their own name).

As a means of expression and for stimulating the imagination of the early blind (e.g., "What does a tree look like?").

As a scratch pad for making brief notes, such as telephone numbers, for elderly blind persons who find braille too difficult to learn.

For written communication between visually handicapped and sighted persons, e.g., for leaving a message.

To allow computer programmers to draw flow diagrams. The figures can be completed with a text in braille by inserting the drawing sheets (backed by a sheet of braille paper) into a regular braillewriter.

For explaining and remembering maps.

For recording and reading written music.

For designing and working out embroidery patterns.

For playing games, e.g., Tic-Tac-Toe and Master Mind.

The set can also be used for the "multisensorial method," giving dyslexic children the possibility of both reading and tactually sensing their written characters.

Finally, the drawing-set may help children with poor hand coordination; drawing on the rubber coating of the board inhibits uncoordinated movements.

The IPO set, with 50 drawing sheets, is available from the Dutch Association for the Blind, Kipstraat 54, Rotterdam, The Netherlands.

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