

Five to Seven Year Olds

Towards the end of the fifth year the child begins to draw diagonals. Pictures become more ordered; using, for example a base line, the objects and figures stand on the ground and clouds float in the air. A person is drawn with six parts and simple schematic pictures can be copied. The child can write his/her own name in block capitals as well as single letters, but writing is more a matter of copying forms.

The maturity of the graphomotor skills is so far developed that the child is able to learn to write. Apart from the basic ability accuracy and speed are then also required (cf. Steding-Albrecht 2003; Becker, Steding-Albrecht 2006).

5.2 Assessment of Children with EB

Restrictions as a result of deformities are in the forefront of the assessment of graphomotor skills.

5.2.1 Graphomotorische Testbatterie¹

This standardised test battery was developed in 1986 by Rudolf. Children aged from 4.6 to 6.11 years can be tested with it, and statements can be made regarding the graphomotor development of the child.

The test battery has seven sub-tests. The individual tests measure the perceptual processes, the visuomotor coordination, the control of movement, the hand–finger dexterity and the ability to use the writing implement on the writing surface.

Which skills are measured by which sub-test are described below (cf. Rudolf 1986).

Labyrinth-Test (LT)	<ul style="list-style-type: none"> – Hand and finger dexterity – Visuomotor coordination – Anticipation of movement – Assessing hand dominance, if necessary
Task-Test (TT)	<ul style="list-style-type: none"> – Visuomotor coordination – Form constancy and shape recognition – Measurement of the ability to recognise, differentiate and reproduce figures
Symmetrie-Zeichen-Test (SZT) (symmetry drawing test)	<ul style="list-style-type: none"> – Measurement of the ability to recognise mirror and symmetrical relationships
Synergie-Schreibversuch (SSV) (synergy writing attempt)	<ul style="list-style-type: none"> – Form and shape recognition – Reproduction from memory

¹ This is a German assessment instrument and so the name has not been translated.

Graphesthesia-Test (GT) (graphesthesia test)	– Using a pencil and paper, six geometric symbols must be reproduced in succession – the general perceptive and motor abilities, e.g. judging distances, lengths, angles and crossings, etc. are assessed
Graphomotorik-Test (GMT) (graphomotor test)	– Ability to comprehend letter patterns (graphemes) in their structure and to reproduce them
Form- und Gestalt-Test (FGT) (shape consistency test)	– Ability to abstract and discriminate geometric shapes and to reproduce them

This test is very suitable for children with EB because it assesses only the results and ignores such things as how the writing implement is held. Even children who have severe limitations of hand function and are handicapped in how they hold the implement can be tested with this test battery. It is advisable to use the implements prescribed by the test (medium soft pencil or red felt-tipped pen) and not to use any adaptive devices with EB children. In this way the standardised values are not falsified, and it is possible to observe how the child manages with typical writing implements.

The results of the test battery give information as to the development of the graphomotor skills in spite of the handicaps. It allows some conclusions to be drawn as to how far the child will be able to cope with the graphomotor demands of his/her schooling.

An alternative to the *Graphomotorische Testbatterie* for English speakers could be the *Beery-Buktenica Test* of visual-motor integration together with the *SCRIPT* (*Scale of Children's Readiness in PrinTing*).

The *Berry-Buktenica Test*, also known as the *Developmental Test of Visual-Motor Integration (VMI)*, is designed to identify deficits in visual perception, eye-hand coordination and fine motor skills such as handwriting. The test can be administered to children from the age of 2 years up to adulthood. It evaluates the visual-motor integration by providing geometric designs ranging from simple line drawings to more complex figures and asking that the designs be copied (cf. Beery et al. 2010).

The *SCRIPT* test is a letter-form copying research test developed by Weil and Amundson (1994). The child is asked to copy 34 letters by using the Zaner-Bloser manuscript alphabet. For scoring, the original criteria provided by Weil and Amundson or modified versions (e.g. Windsor 1995) can be used (cf. Marr et al. 2001; <http://ecrp.uiuc.edu/v3n1/marr.html>, 2011).

5.2.2 Observation of Drawing and Writing

To be able to analyse the graphomotor abilities of older children (from 6.11 years), graphomotor exercise sheets may be used.

A second possibility is to ask for a writing sample (e.g. the child copies a short text). While this is being done, the therapist can observe such things as holding the writing implement, the pressure used, how the arm of the writing hand is moved across the desk/table, change of direction of strokes, fluidity of movement, speed, endurance, etc.

5.2.3 The Mann-Zeichen-Test²

This test was developed in 1949 by Ziler to assist in the determination of school readiness and the possible necessity of special needs schooling. Later it was also used to measure intelligence. Brosat and Töttemeyer (2007), however, confirm in the revised version of the test that it is not suitable as an intelligence test. Rather it gives information about the development of visual-perceptual processing, especially the visuomotor coordination, the figure-ground differentiation and spatial perception of children.

The task in the test is 'draw a person as well as you can'. To do this the child only has one sheet of paper (DIN A4) and a pencil available.

The individual details of the drawn person are evaluated according to 52 criteria; this includes the in- or exclusion of details, while such things as the aesthetics or proportions are not considered. From the results the *Mannzeichen age* (that is the level of development in drawing a person) can be assessed and compared with the actual age of the child to find out whether this is typical or there is a delay.

As it can be assumed that a child draws a person in the way that it perceives him-/herself, the *Mann-Zeichen-Test* can be seen as an indication of the general development the body scheme and own body perception.

It must be noted that a child should not be assessed exclusively on the *Mann-Zeichen-Test* because it is not possible to draw conclusions about the entire development from one drawing (cf. Brosat, Töttemeyer 2007).

Children with EB have to live with a certain degree of pain from babyhood. They are often restricted in their experience possibilities, in their motor development and in their body awareness, and often have deformities of their hands and feet.

The *Mann-Zeichen-Test* can give information not only about their graphomotor skills along with spatial and visual abilities but also about their body perception (e.g. how are the arms, hands and fingers or legs drawn?).

5.3 Assessment Results

Experience to date shows that writing with a pencil is less of a problem for children with EB than might be expected, considering the frequent massive hand deformities.

As long as there are no contractures, mutilations or webbing to cause handicap, children with EB have not been observed to have any more difficulties with the graphomotor skills than typically developed children.

As a rule, even the pressure of holding the pencil only causes problems with very few children. The danger of blistering is relatively small.

However, the movement of the arm across the table causes friction, which can lead to increased blistering on the forearm and the elbow.

² This is a German test which should not be confused with the draw-a-person test, although it is the drawing of a person.

Well-developed graphomotor skills depend on the fine movements of the PIP and DIP joints of the thumb, and middle and index fingers. Children with JEB are often handicapped or have problems because of the scarring and contractures, which limit the range of motion of these joints (see Fig. 5.1c,d).

The writing movements then come much more from the wrist, elbow and shoulder and so the lack of mobility in the fingers can be well compensated, but the writing process is less economic and more tiring. Even so, the speed usually suffices to complete the school requirements (writing in class for short periods).

However, during long periods of writing children with EB become tired more quickly because of the poor economy of effort.

Children with DEB have not only the lack of finger movements, but also can have mutilations, pseudosyndactyly and contractures of the fingers. In some cases their hands have the appearance of mittens which are surrounded by an epidermal cocoon; usually only the thumb is free to move. Such children grasp the pencil, as shown in Fig. 5.1b, with a lateral grip.

If the abduction and opposition of the thumb is severely limited because of adhesions, only very thin pencils can be held.

Through using a lateral grip the hand is held fully in pronation while writing and cannot slide across the paper on the ulnar side as usual. This larger surface causes more resistance and friction, which makes writing even less economic than described above. This means that writing is usually slower and the child tires even more quickly.

Hand dominance: No difference has been observed in hand dominance between children with EB and other children. Further, the dominant hand is no more affected by webbing and contractures than the non-dominant hand (cf. Mullett 1998).

Development of drawing: The majority of the children who have been assessed show a development of drawing compatible with their age, even in cases of severe limitations of pencil grasp (*Mannzeichen age* – see Chap. 5.2.3).



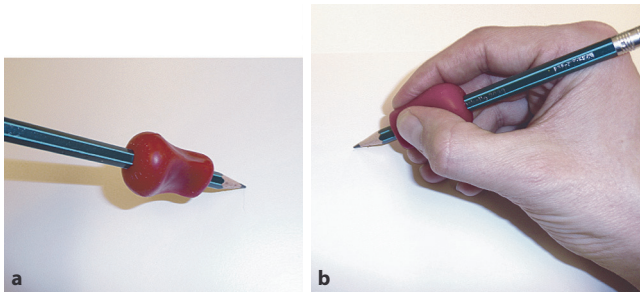
■ **Fig. 5.1** Different ways of holding a pencil in children with EB. **a** Palmar supinate grasp. **b** Lateral grip in the case of an epidermal cocoon (DEBRA Austria). **c–e** Limitations of the finger movements due to scarring and contractures (Hametner)

5.4 Occupational Therapy

The graphomotor problems children with EB have are mostly due to the physical situation of the hands and fingers caused by the condition. OT therefore concentrates on retaining the movement of the wrist and fingers for as long as possible, adapting the pen or pencil to the needs of the child and developing the most economic compensation strategies. It does not aim to improve dexterity or perception.

5.4.1 Occupational Therapy Intervention Focusing on Drawing and Graphomotor Skills

- Most children manage to use customary writing implements quite well. In some cases the use of an ergonomic grip is an improvement, assuming that there is an adequate abduction of the thumb. Figures 5.2a,b show a soft rubber grip which can be used to minimise the pressure while writing. Most other available assistive writing devices (e.g. triangular ones) have been shown to be less satisfactory because they are made of a hard material and have sharp corners.



■ Fig. 5.2a,b Pencil grip – ergonomic writing device

- For children who have a very limited abduction of the thumb (see Fig. 5.1b), an individual grip can easily be made by using silicone elastomer (see Fig. 5.3). This reduces the pressure of the side of the pencil on the skin. Because the volume of the pencil is only marginally increased, this variation is suitable for many children with epidermal cocoon deformities of the hand and limited abduction of the thumb.



■ Fig. 5.3 Pencil thickening made of silicone elastomer

- Clothing made of easy sliding material, e.g. silk, can help the movement of the arm across the table when writing and so minimise the friction. It is also possible to attach sheepskin to the sleeves to ease movement.
- Gel roller pens (see Fig. 5.4) can be used because the roller creates little resistance and so facilitates writing.



■ Fig. 5.4 Ergonomically formed pen with a gel roller system

- If compression gloves are worn, it is important to take care that they do not hinder the child in holding the pencil, e.g. the opposition of the thumb.

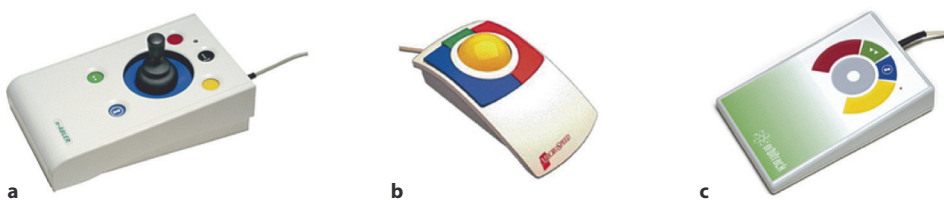
Computer Adaptation

- When the hands are very severely handicapped, writing with a pen or pencil can be very tiring so that the use of a computer should be considered. For many children a touch pad or small computer mouse is adequate for good handling (see Fig. 5.5).



■ **Fig. 5.5** Small laptop mouse *left* in the picture

- Individual solutions for the handling of a computer can be worked out together with firms which specialise in providing computer adaptations, e.g. using:
 - A mouse that reacts to minimal touch or can be controlled by the thumb alone (see Fig. 5.6a–c)
 - Touch screen
 - Speech-recognition programmes



■ **Fig. 5.6** Assistive devices for the computer. **a** Special PC mouse 'nAblar Joystick' (LifeTool) reacts to minimal touch. **b** Special PC mouse 'Kidtrack Trackball Colour' (LifeTool) with large mouse keys for right- or left-handed people. **c** Special PC mouse 'nAblar Orbitrack' (LifeTool) for children and people with very limited motor abilities

- If neither writing nor typing on the computer is satisfactory, it may be possible to copy some things from fellow pupils, or a dictating machine can be used.

6 Independence in Everyday Life and Provision of Assistive Devices

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The assessment possibilities described here present more information and additions to those outlined in Chap. 4, 'Development of Hand Functions', and refer in particular to everyday activities.

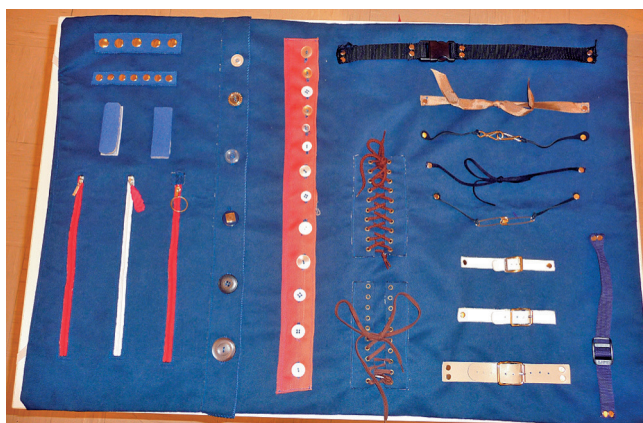
6.1 Assessment of Children with EB

Use simple soft items such as bananas to find out how well a child can cut and pick up food with a fork and a spoon. Alternatively, therapeutic putty may be used (see Fig. 6.1a–c).



■ **Fig. 6.1** Using cutlery (Hametner). **a** Manipulating a fork. **b** Picking up small things with a spoon. **c** Cutting with a knife

A board with various fastenings is useful for analysing manipulation problems (see Fig. 6.2). In this way some simple adaptations such as rings on zips can be tried out.



■ **Fig. 6.2** Fastenings board for the assessment of the manipulation of fastenings

Occupational Therapy in Epidermolysis bullosa

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