

Assistive Technologies 2

Human Computer Interaction Group (HCI)

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Unter Verwendung von Unterlagen von Prof. Zagler © 2013
Für den Gebrauch im Unterricht an der TU Wien © 2019

3. Tactile Communication (continued)

3.5 Writing, Embossing and Printing

3.6 Tactile Graphics

3.7 Braille Displays

3.8 Braille Devices

3.9 Excursus: Screenreader

3.10 Excursus: Use of works/Conversion

3.11 Excursus: Apps and Services for blind people

4. Picture and Symbol Languages

4.1 Basics

4.2 Bliss

4.3 Excursus: Augmentative and Alternative Communication (AAC)

3. Tactile communication

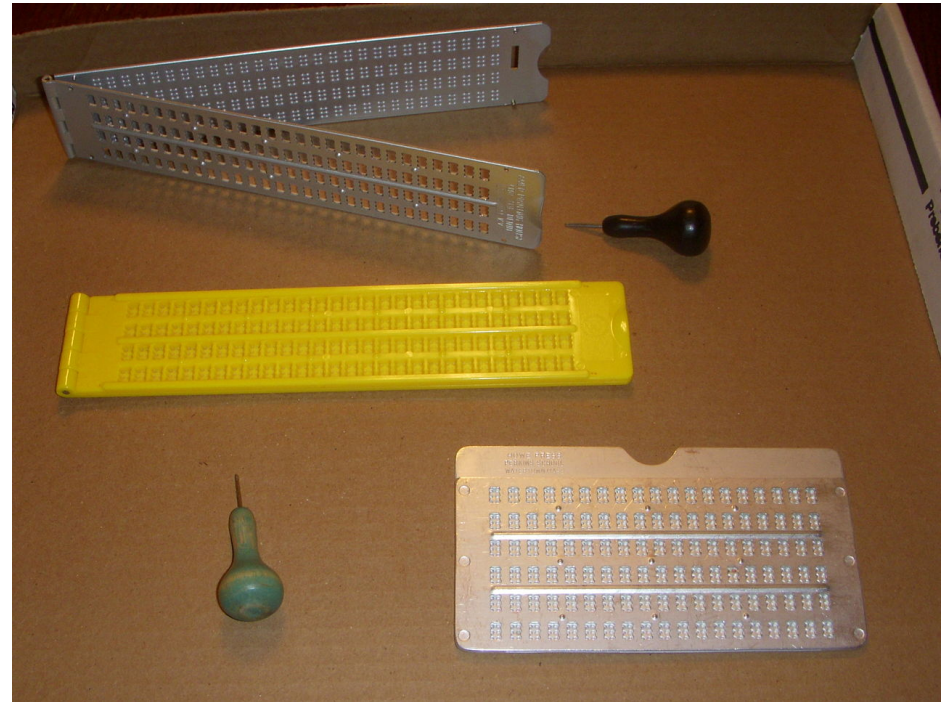
3.5 Writing, embossing and printing

Writing with the Braille template (and stylus)

Oldest and technically simplest method for producing Braille documents.

Various small Braille templates used for e.g. creating notes and index cards (here in sizes 4 × 28 and 6 × 19 forms)

Source: Wikipedia



Can be practiced with a Braille Simulator:

<http://www.fakoo.de/braille/braille-tafel.html>

A recommended exercise for thinking in mirror writing!



3. Tactile communication

3.5 Writing, embossing and printing

Writing with the Braille template

(embossing board, Braille board, Braille slate, German: Braille-Tafel)

Braille boards consist of 2 plates (made of metal or plastic), connected by a hinge, in between thick paper (approx. 160g/m²) is laid. When folded together, the sheet is punched by dowel pins attached to the plates (for fixation and so that it can be used accurately after a removal).

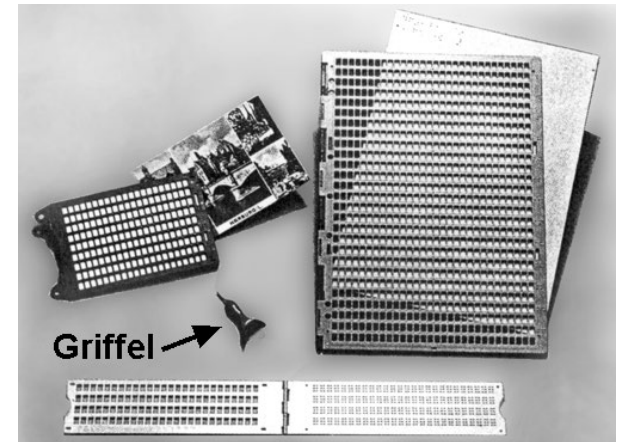
Upper plate: contains a rectangular opening for each Braille form

Bottom plate: has a hemispherical indentation for every possible point of Braille.

Writing by stylus: Diameter and rounding correspond to the points of Braille.

Each point is individually marked by hand. **From right to left and in mirror writing!** => No immediate control possible (Only after removal of paper from the template the written Braille forms can be read!)

There are templates in many sizes (a few lines up to the A4 format) available. There are also stencils for making double-sided braille printing (interpoint Braille).



3. Tactile communication

3.5 Writing, embossing and printing

Typewriters for Braille

Kleidograph, William B. Wait, 1894, New York Point

Operable with one hand by combinations, the other hand can read at the same time

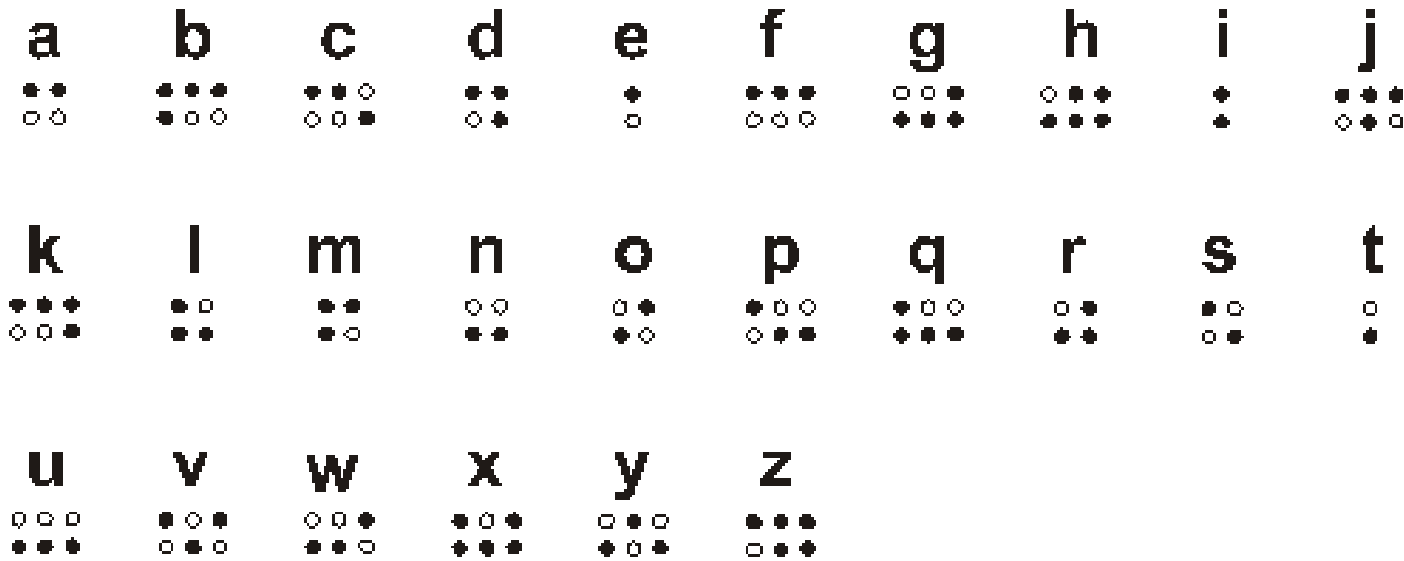
Used widely in U.S. in late 1800's and first half of 1900's till the "War of dots" was ended (and American Braille was widely adopted)



New York Point (William B. Wait, 1872)

Optimization of space requirements

Complete conversion to an 8-point scheme



Typewriters for Braille

Significant advantages over the Braille board:

much faster writing speed (with a hand movement not only a single point but a whole shape is generated).

Creation of braille shapes from back to front (that is, true to the side and from left to right). This allows the written text to be checked immediately and without having to turn the page on a Braille typewriter.

Benefits of the Braille board:

Especially small Braille boards are lightweight, small, easy to carry along and can be used almost anywhere - use for taking notes.

Remarks: Mainly purely mechanical Braille typewriters are used (typically, for example, Perkins-Brailler, Marburg-Lahn Braillewriter (Marburger Bogenmaschine)); only occasionally also electrically operated models.

For operation of a purely mechanical typewriter, a considerable force must be expended (in the range of 30 N to 40 N), since several keys must be struck simultaneously. Correction not possible (therefore override with form that has set all points).

Distinction in sheetfed machines (emboss a sheet = a sheet) and strip machines (emboss endless paper strips, also called Steno machines) (German: Bogenmaschinen vs. Streifenmaschinen)

Collection of braille writer devices: <https://www.aph.org/museum/collections/featured/mechanical-braille-writers/>

3. Tactile communication

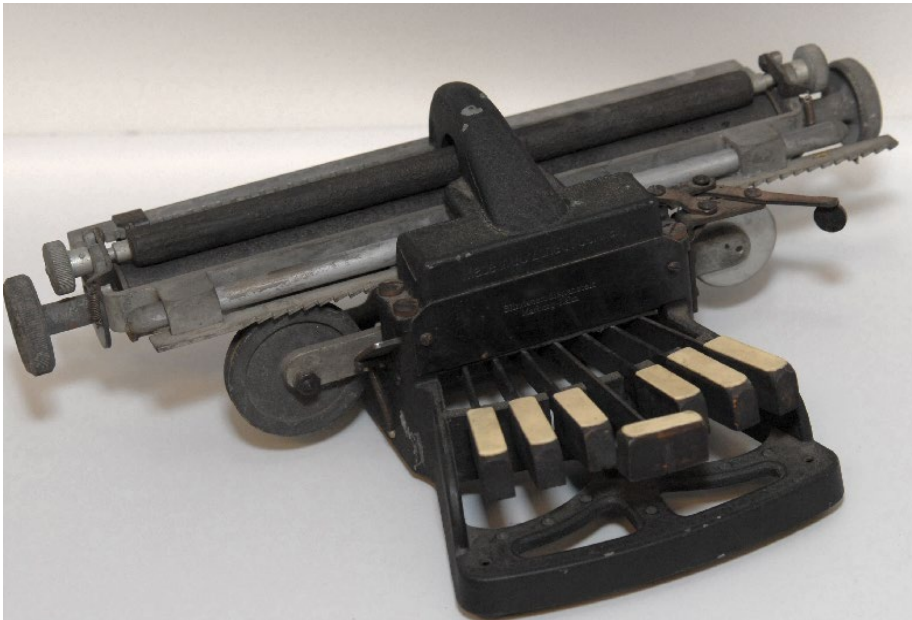
3.5 Writing, embossing and printing

Marburg-Lahn Braillewriter, Germany (Marburger Bogenmaschine) 1946 and 2008

The sheet is wound up on the roller

Proven mechanical principle

The Marburg-Lahn writer is an updated version of an Oskar Picht braille writer invented 1899. (For picture see block #2)



Deutsche Blindenstudienanstalt (blista) in Marburg

The director of the Marburg University Eye Clinic establishes courses for war blind people in 1915 after the First World War

- Approximately 300 students in high school (2014)
- Rehabilitation facility for the blind and visually impaired
- German Blind Library
- Braille printing company

3. Tactile communication

3.5 Writing, embossing and printing

Perkins Braille (USA)

Invented in 1951, the world's most widely used purely mechanical Braille typewriter, still up-to-date today

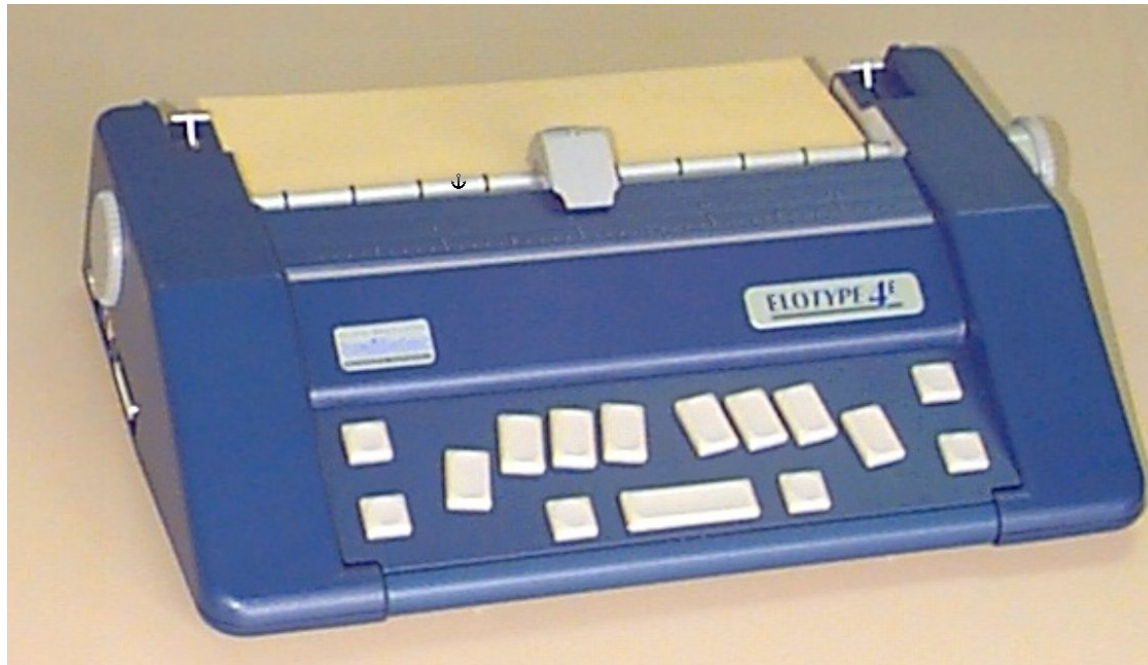


<http://www.perkins.org/>

3. Tactile communication

3.5 Writing, embossing and printing

Elotype (Germany) electric



3. Tactile communication

3.5 Writing, embossing and printing

Mountbatten Brailler (Australia + UK)

Battery powered

Speech Feedback

Automatic paper feed

6 and 8 point Braille interfaces

Display option



3. Tactile communication

3.5 Writing, embossing and printing

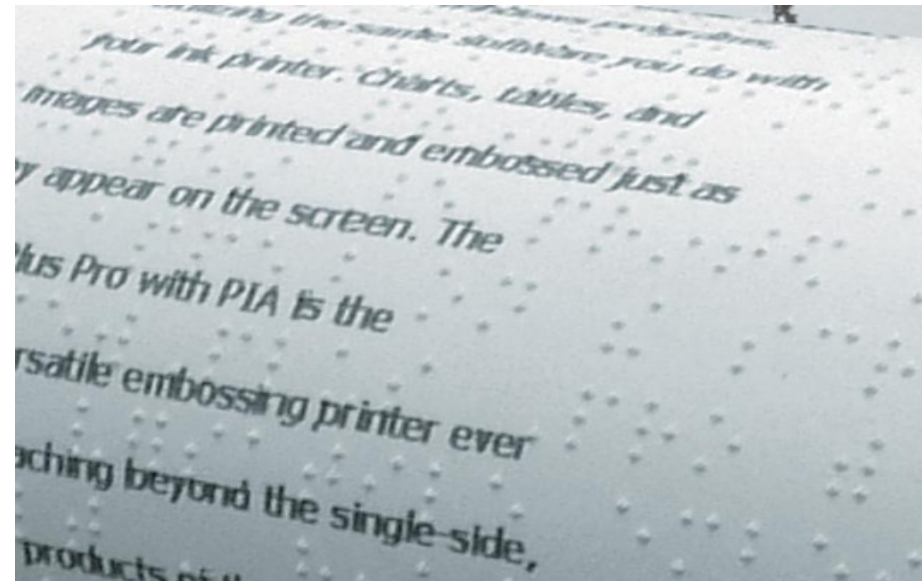
Ohtsuki Typewriter (Japan)

Manufacturer: Technol Eight Co. Ltd., Tokyo

Electric typewriter for educational purposes (inclusive education of blind children)

Prints Braille + Blackprint (interlinear)

Is to be seen as a special feature



3. Tactile communication

3.5 Writing, embossing and printing

„Banks Pocket Braille Writer“ of IBM:

Writes on a ½-inch wide piece of paper.

Inventor: Alfred Banks, Producer: IBM

New York, 1928

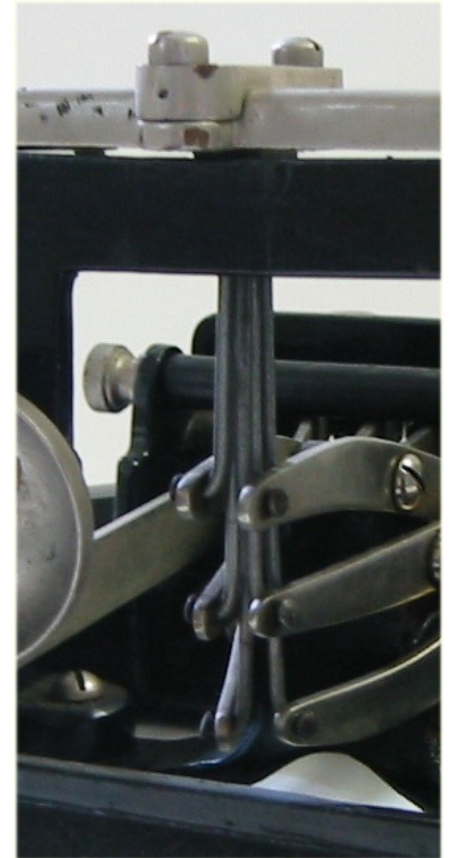


3. Tactile communication

3.5 Writing, embossing and printing

Typewriter for Braille Stenography

Stainsby "C" Model Shorthand Machine
ca. 1899, Birmingham, England

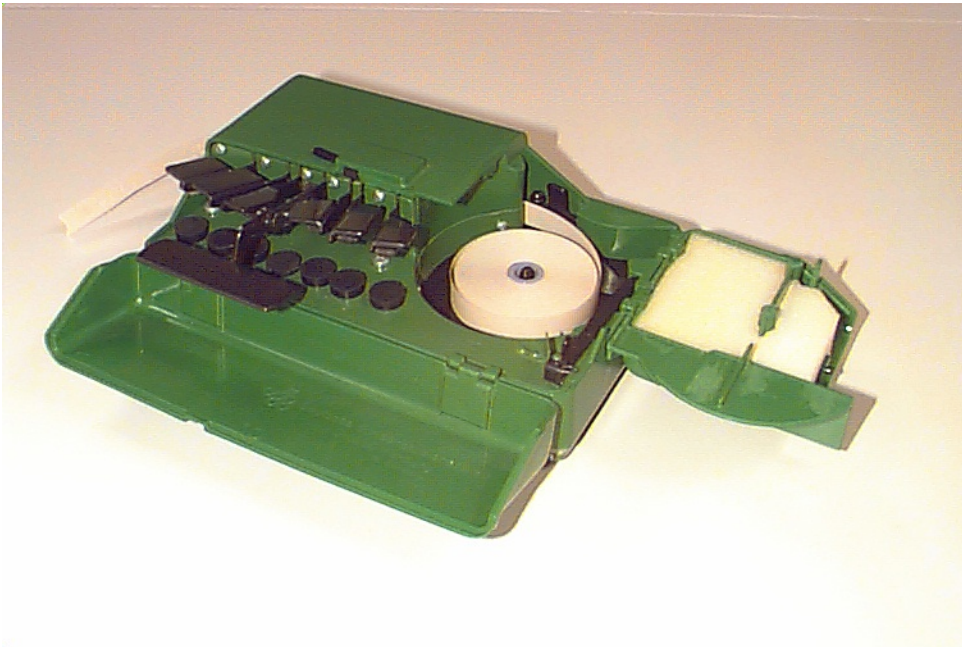


3. Tactile communication

3.5 Writing, embossing and printing

Typewriter for Braille Stenography

Marburger Streifenmaschine (stripe machine)

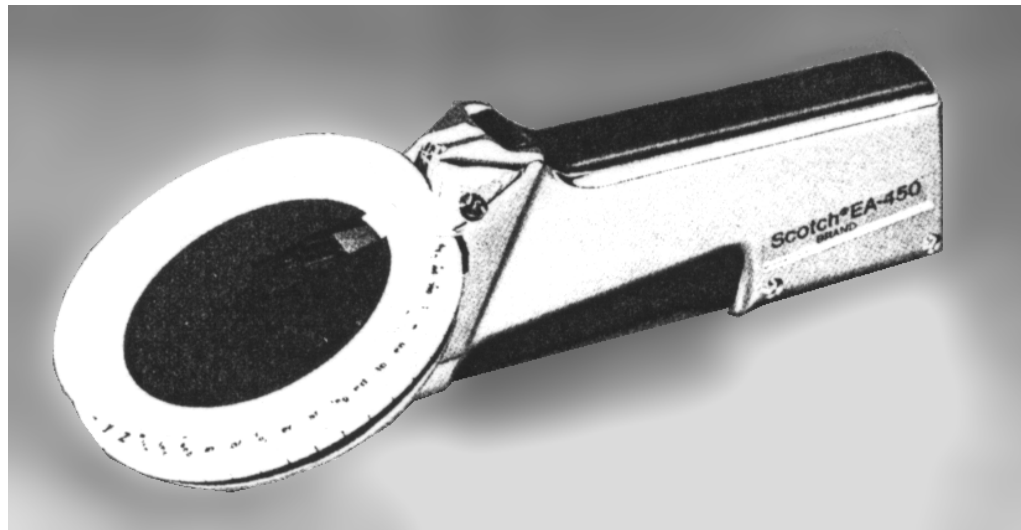


3. Tactile communication

3.5 Writing, embossing and printing

Embossing pliers for Braille labels

Dymo or 3M (scotch), embossing wheels in Braille
For permanent labeling e.g. in the household



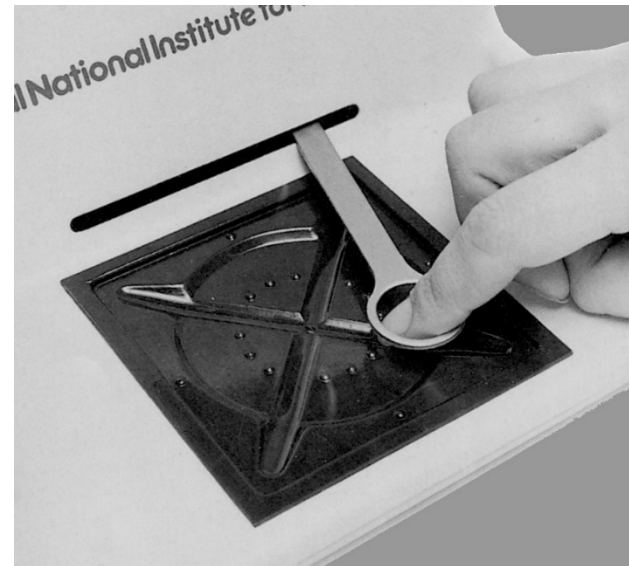
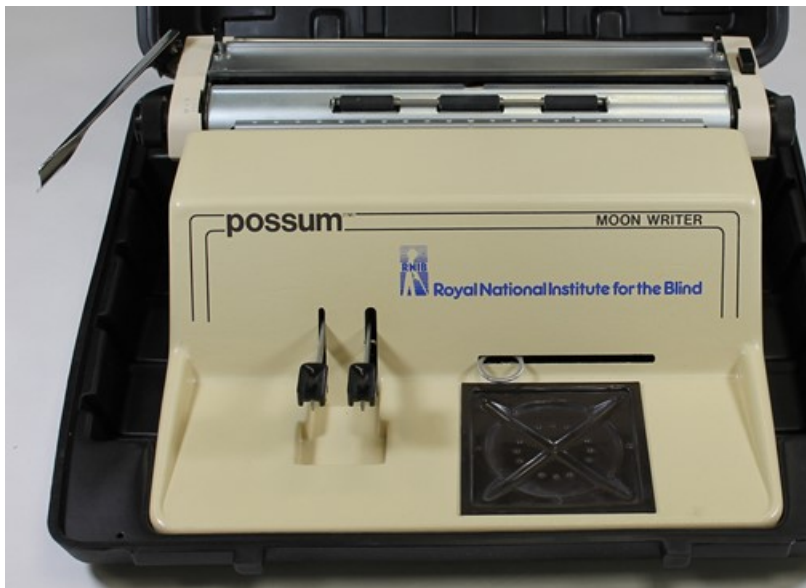
3. Tactile communication

3.5 Writing, embossing and printing

Typewriter for Moon font

"Possum Moon Writer" (RNIB) since (first) 1986, manufacturer:
Possum Controls Limited, UK

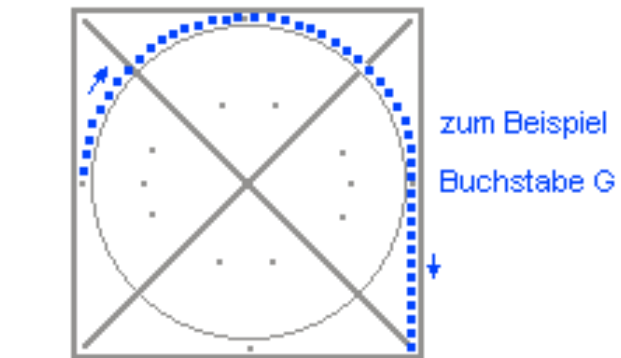
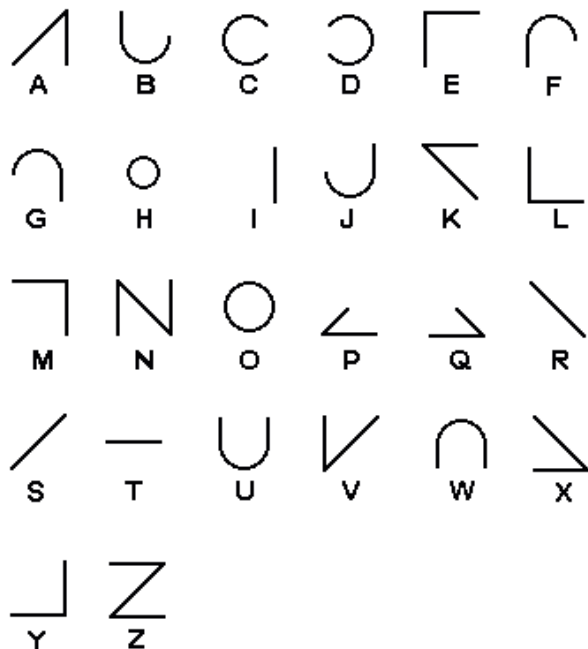
"Draw" - embossing, Moon symbols are drawn in the "writing rectangle"



Typewriter for Moon Script (cont.)

Modified characters for Moon Writer:

Source: after Alexander Fakoó (www.fakoo.de)



Schreibviereck des Moon-Writers

Drawing rectangle for characters

Example: "G"

Production of Braille documents

(in quantities exceeding single copies)

For larger editions (since the end of the 19th century)

there is a manufacturing process in 2 steps:

By means of a Punziersmaschine (hallmark machine) an embossing template is created.

A printing press generates the copies from the embossing template.

For medium to small print runs:

Today electronically controlled Braille printers are used, which can be connected to any PC.

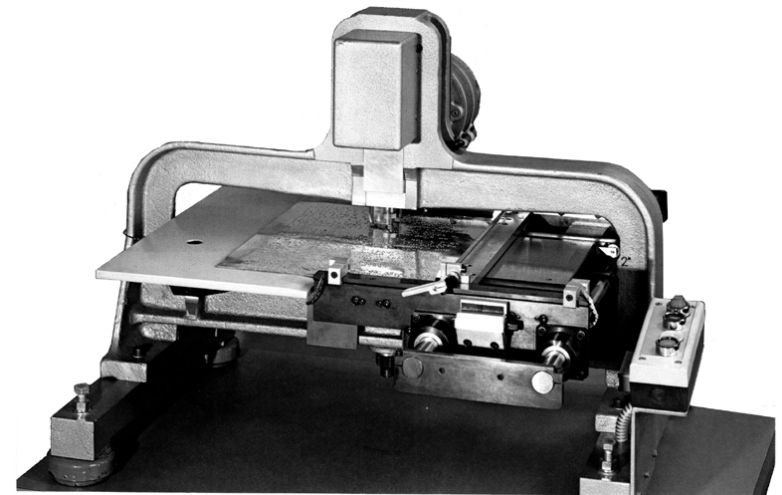
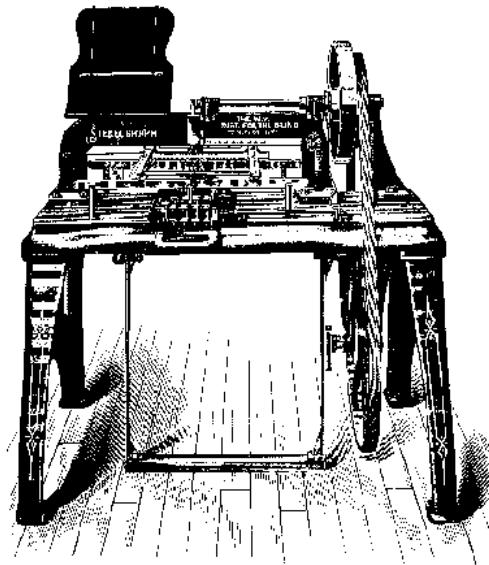
3. Tactile communication

3.5 Writing, embossing and printing

Embossing by hallmark machine (German: Punziersmaschine)

Production of master (zinc sheet, plastic)

Stereograph (circa 1894) NC Punching Machine PUMA



In principle, a hallmark machine works like an electric sheet machine, except that instead of the Braille paper, the die is coined, to which, of course, much larger forces must be applied.

The first punching machines were operated directly by hand (every single letter was entered via a keyboard). Errors could only be eliminated by relaxing and smoothing the zinc plate. Modern devices work as computer peripherals and, like a printer, are controlled by a corresponding Braille word processing program.

3. Tactile communication

3.5 Writing, embossing and printing

Braille presses

Jobbing press or rotary machine

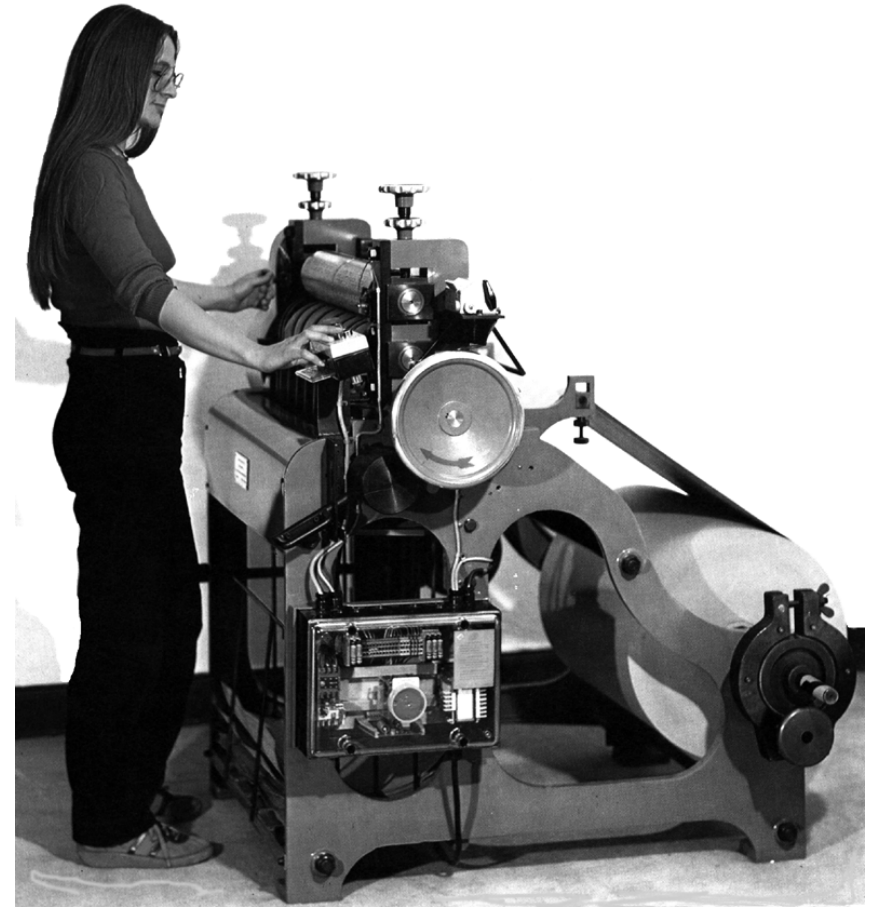
(German: Tiegelpressen oder Rotationsmaschinen)

A typical page in Braille:

24 to 25 lines with max. 40 shapes

(up to 1,000 characters per sheet)

Usual sheet size is 11 "x 11" (28 cm x 28 cm)



Braille-Press (Rotary principle)

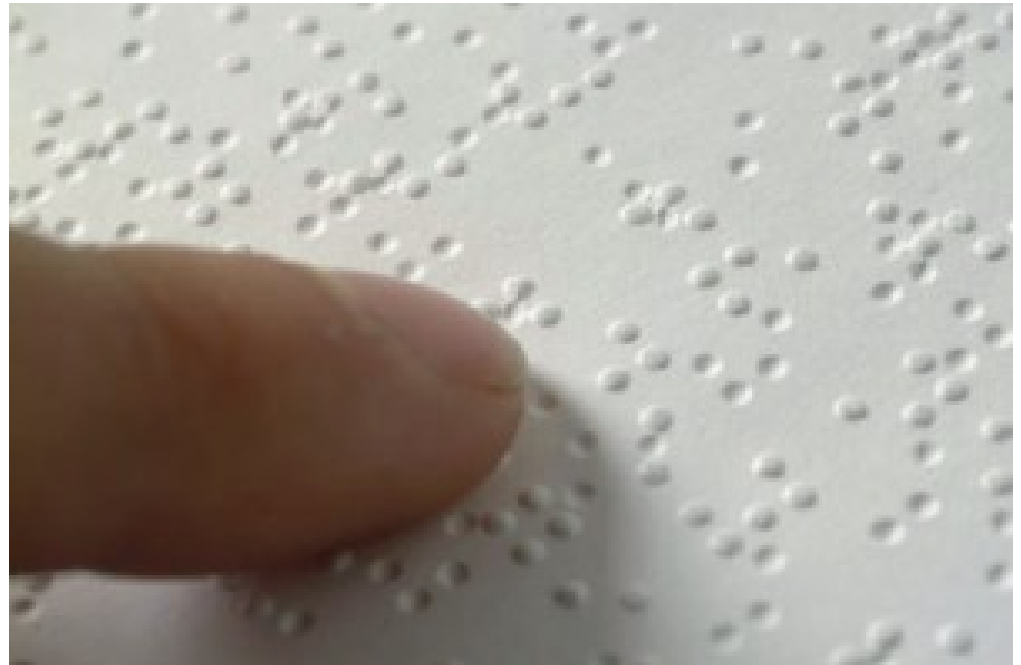
Two-sided braille print

Intermediate dot printing (printing from both sides),
slightly offset

Interpoint Braille

Space-saving

Quality suffers
Somewhat from
double-sided
printing



3. Tactile communication

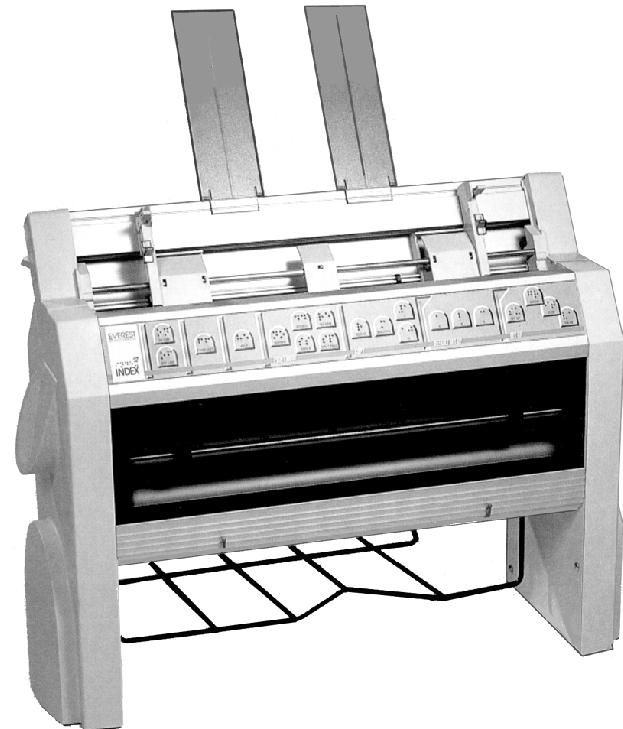
3.5 Writing, embossing and printing

Braille printer for connection to a PC

Examples of desktop printers (single-sided or double-sided)



Braille printer Basic-S



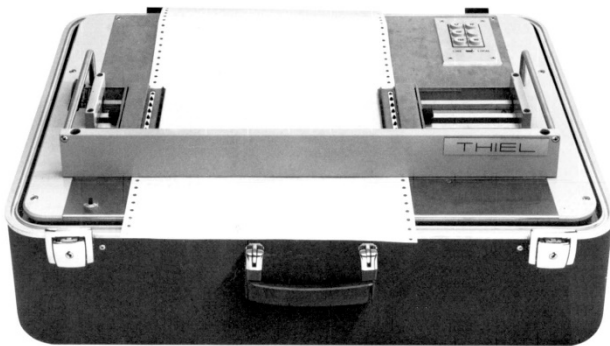
Braille printer Everest, doublesided

3. Tactile communication

3.5 Writing, embossing and printing

Braille printer for connection to a PC

Examples of production printers



Braille printer Thiel Beta-X3



Braille production printer ELEKUL

Earlier: translation and production

Creation of the text in machine readable form

Removal of common black-letter formatting

Inserting formatting for Braille: New paragraph by indentation (by 2 or 3 forms)

Conversion in full or shorthand Braille

Today: Often not necessary, because Internet-based (screen reader - see later, eBooks)

Embossing still for business cards, medicine packages ...

Braille usage video

Reading and Writing with Braille:

<https://www.youtube.com/watch?v=fU0vmOUlswM>

Shows briefly the different facets of the use
(embossing stencil, typewriter, PC, Braille labels at home)

Duration: 7 minutes, in German

Earlier: Braille press or Braille printer?

Printing costs depending on the number of copies to be printed

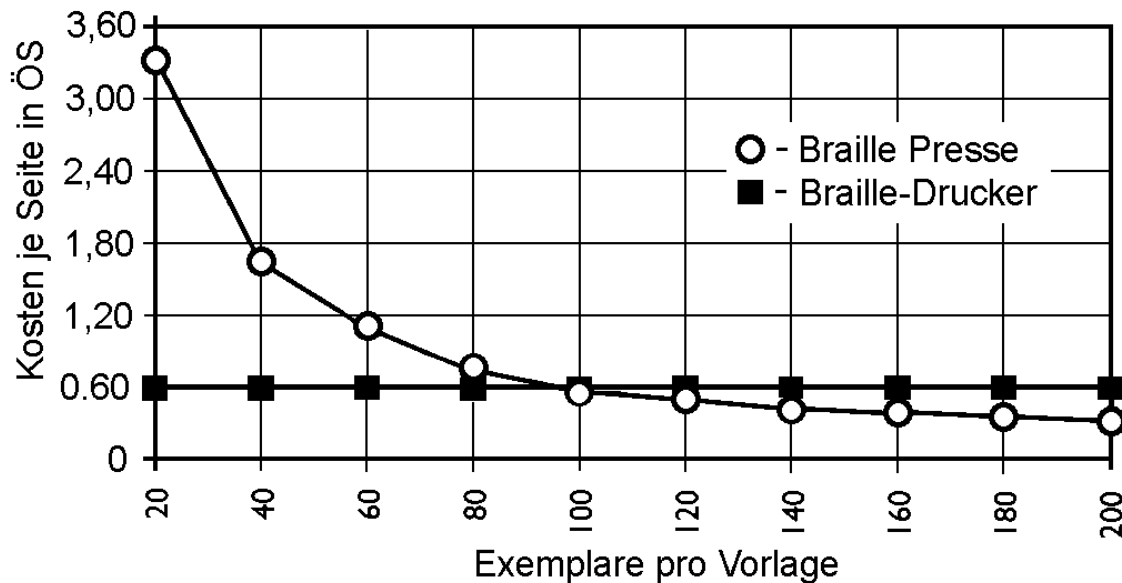


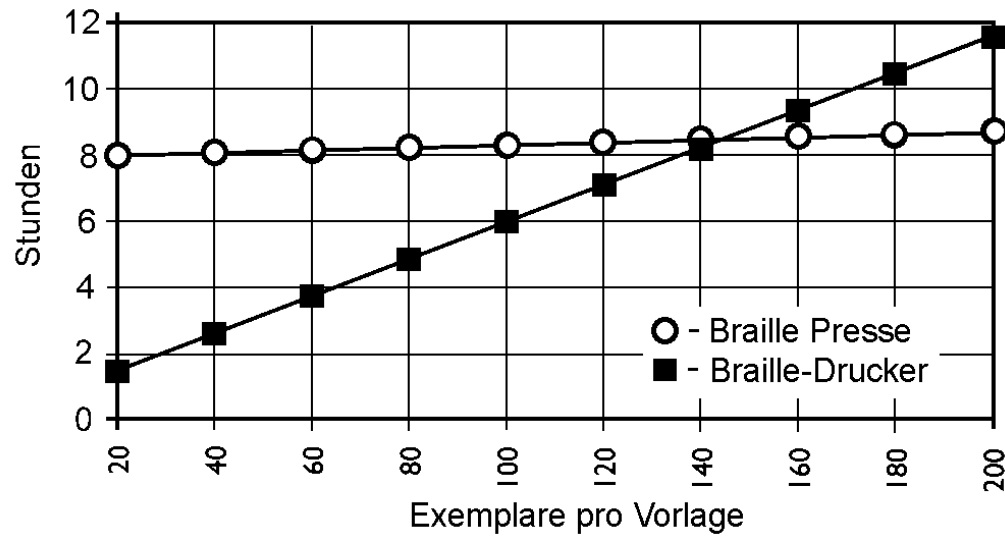
Figure shows the production costs for different numbers of produced copies (print runs) in comparison between Braille printers and Braille presses.

It can be seen that for runs up to 100 copies, a Braille printer is usually more profitable both in terms of production time and cost. From about 150 copies up the benefits of the Braille press outweigh. (see also next figure).

Earlier: Braille press or Braille printer?

Comparison of production speed depending on the number of copies to be printed.

(duration in hours!)



Graphic tactile material is required for:

Understanding charts

Capturing spatial relationships

Even without braille knowledge important contents:

Drawings, plans, maps

Presentation:

tactile (only the essentials, explanation on side leaves)

tactile and acoustic (for example for additional explanations)

Production methods

Manually

Deep-drawing (German: Tiefziehen)

Swell paper (Minolta copy) by heat (German: Schwellpapier)

Graphic dot print

Auditory supported graphics

3-D printing (?)

Manual production

The first tactile graphics were made by hand: suitable materials such as wooden sticks, cardboard, sandpaper etc. were cut to size and glued to a base.

Hand drawings (e.g., teaching in geometry): thin plastic films are clamped in soft-bottom drawing frames and labeled by stylus (e.g., an empty ballpoint pen). The stylus, which is passed over the film with moderate pressure, deforms and stretches the film along a track, which can be felt (possibly after the film has been turned over).

Use of liquefied wax or thick paint applied directly to the drawing surface with a suitable writing instrument (e.g., heated tube spring).

Deep-drawing/Thermoforming

Making a 3-D model

Manual production of cardboard, wood, embossing strips, sandpaper, "craft materials"

NC-controlled milling machine

Deep drawing with heating and vacuum on thermoplastic films (e.g., PVC). "Vacuum thermoforming machine"

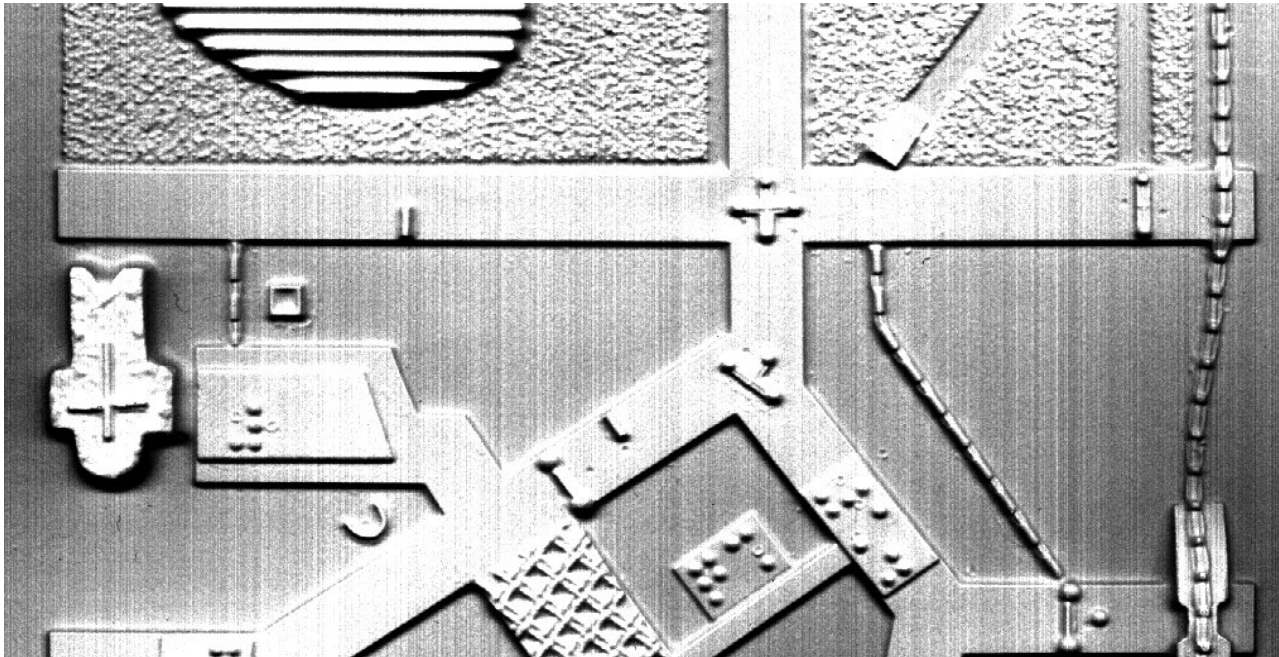
Production of graphics with more than two levels possible



Deep drawing of maps (Euro Town Kit)

Surfaces with pronounced texture

Standard symbols for maps / city maps



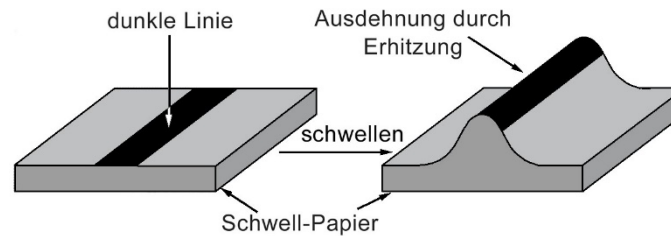
3. Tactile communication

3.6 Tactile graphics

Swell-Paper

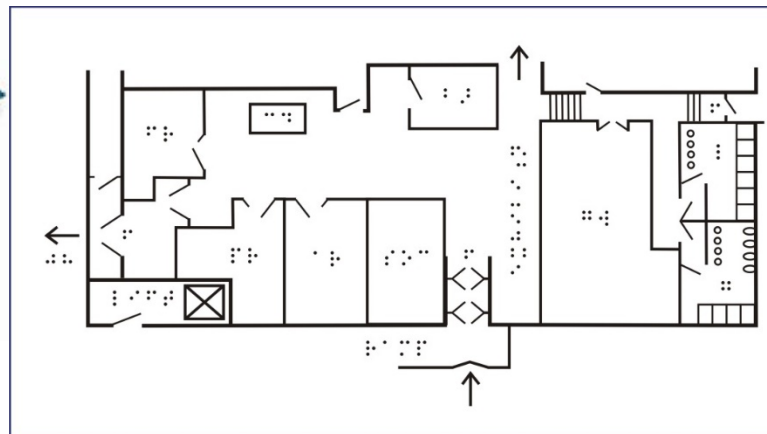
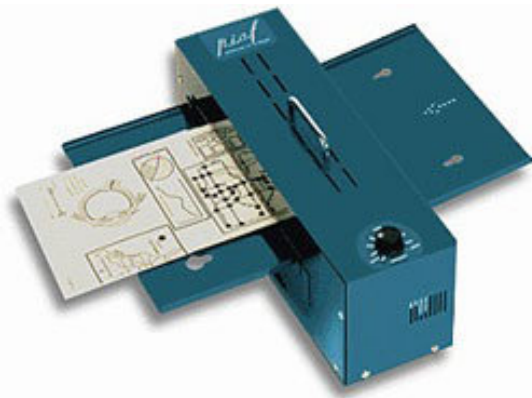
Printing with conventional laser printers or copiers

Heating in the "fuser" leads to swelling of the dark (printed) areas



In the process developed by Minolta for the production of tactile reliefs, a conventional plain paper copier first prints the desired image in black and white on a special paper. If this paper is irradiated with an infrared device in a subsequent treatment step, the blackened parts of the sheet heat up more strongly and cause there to swell the microcapsules contained in the coating of the paper. The paper therefore bulges at the printed areas and creates a palpable relief. The advantage of this method lies in the rapid implementation of drawings in a tactile perceptible form. However, it is not possible to make fine structures as well as tactile graphics with more than two levels.

It is also possible to do a hand drawing directly on the Swell paper, provided it uses an ink that absorbs infrared light well.



Graphic printer

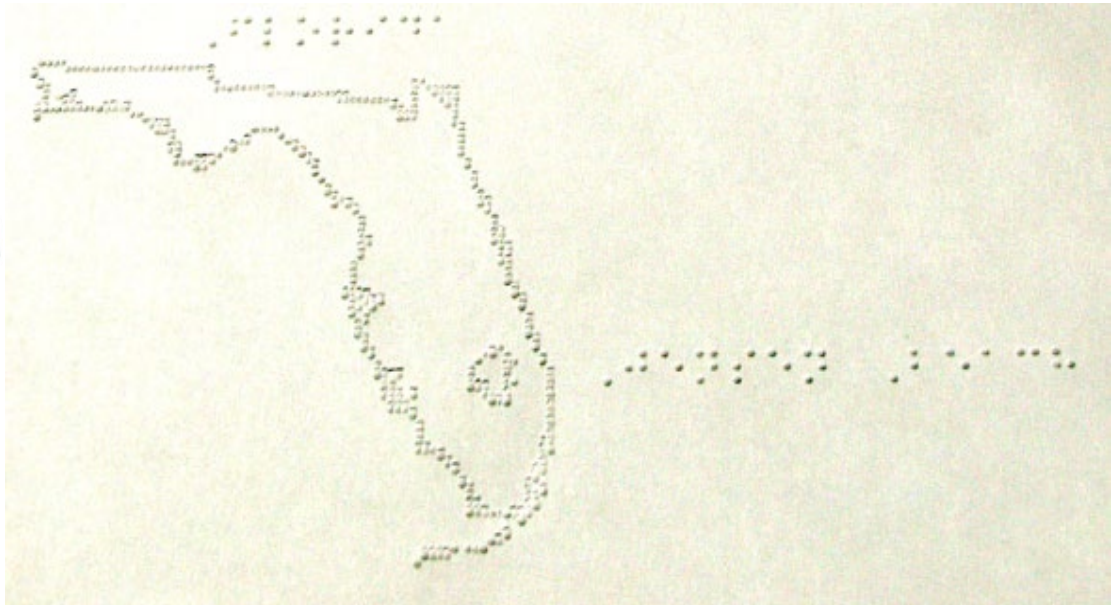
Braille printer with narrow dot matrix

Most Braille printers, especially those in the middle and upper price range, are able to not only stamp the embossed dots on the braille screen, but also to emboss dots anywhere.

This provides the ability to create simple line graphics by closely lining up embossed dots with a Braille printer.



TIGER – Graphic Braille printer (ViewPlus)



3. Tactile communication

3.6 Tactile graphics

Audited graphics

Especially teaching material and orientation plans in tactile-graphic form have the disadvantage that there is insufficient space for captions and explanatory texts in Braille or that users do not have sufficient competence in reading Braille.

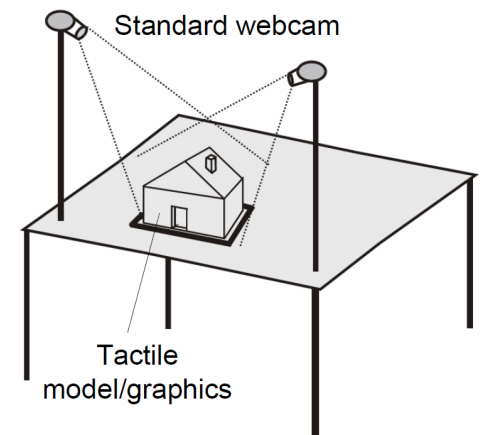
A combination of tactile graphics and spoken messages can compensate for this deficiency.

The tactile template (made according to one of the methods described before) is placed on a graphics tablet. The PC connected to the tablet is programmed in such a way that, when the tactile template is touched, a voice message intended for the respective position is reproduced. For example, maps can be compiled by capturing local relationships via the haptic modality, but announcing the names of the sites via the PC's speech output. The plan therefore does not require any labels in Braille.

Alternative: One or more cameras to detect the finger, when approaching a (previously defined) location, a message is played back. This technique is also applicable to three-dimensional objects.



3D Finger Feasibility Study: Film with palpable map of Europe (including a color print), above a webcam

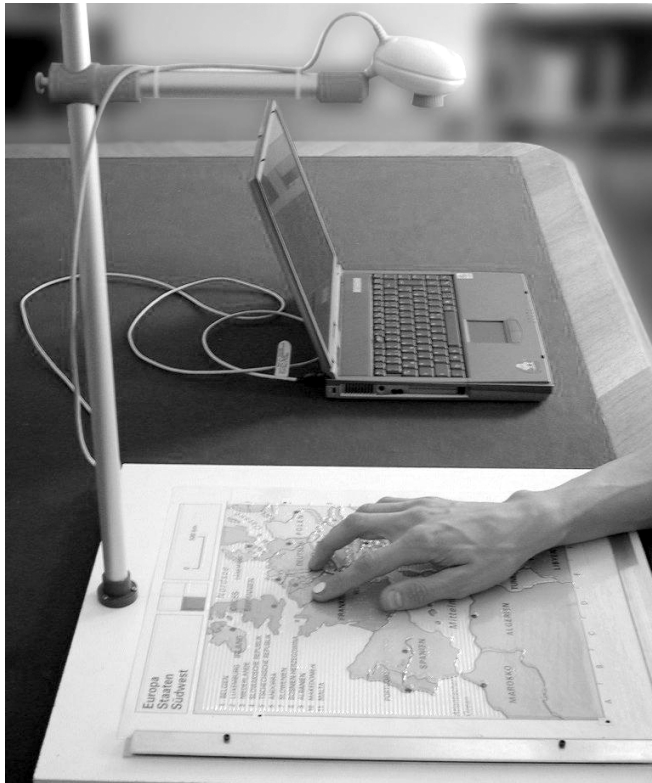


Several cameras support 3D objects

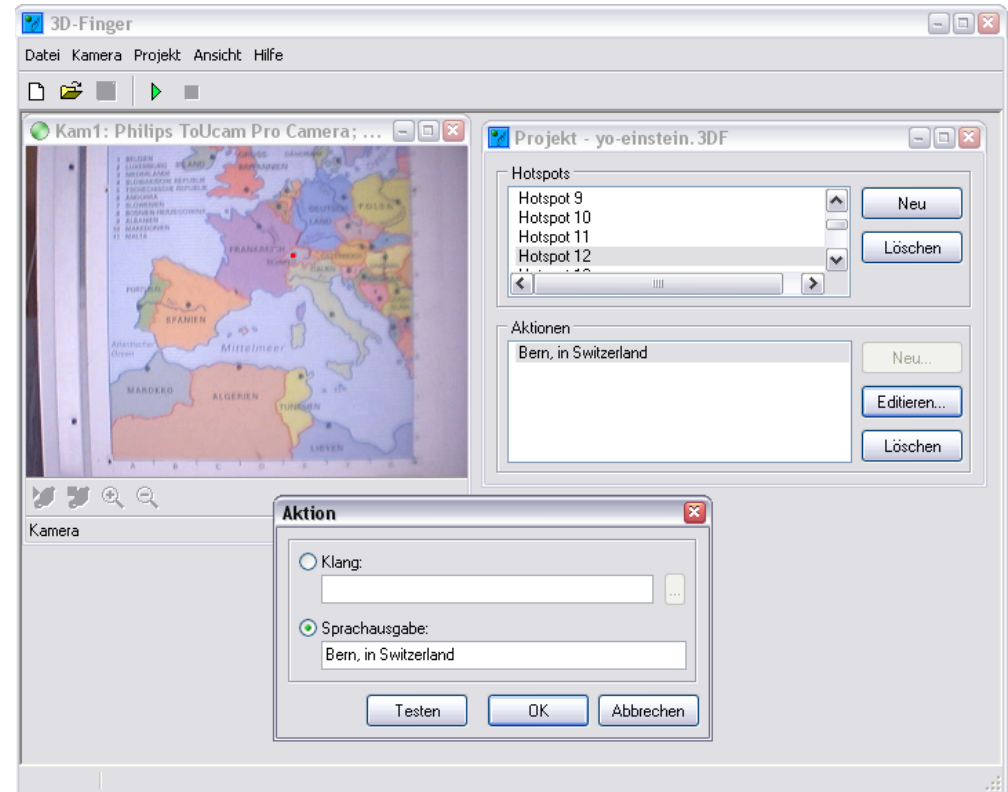
3. Tactile communication

3.6 Tactile graphics

Audited/Auditively supported Graphics



*Tasting forefinger on tactile map (fingernail is marked here with color point)
Webcam on the tripod, connected to the laptop*



The software on the laptop serves a.o. to define selected points or areas ("hot spot") on the tactile object (here a map) and to determine the messages that are spoken or reproduced when the finger reaches the respective hot spot.

Braille displays

Dynamic display systems for braille

Alternative to screen for sighted persons

Stimulation of the sense of touch by:

- Pressure (static)
- Vibration (time-varying pressure)
- Electrical irritation of the skin (electro-cutaneous stimulation)
- Surface texture
- Heat (thermal stimulus)

Note: pressure and vibration are of practical importance nowadays

Requirements

Mechanical stroke: approx. 0.5 mm

Force: 200 mN

Grid: 2.4 3.2 mm

Number of Braille forms: 20, 40, 80

Important is a relative movement between finger and display

- Tangential movement

- Vibration

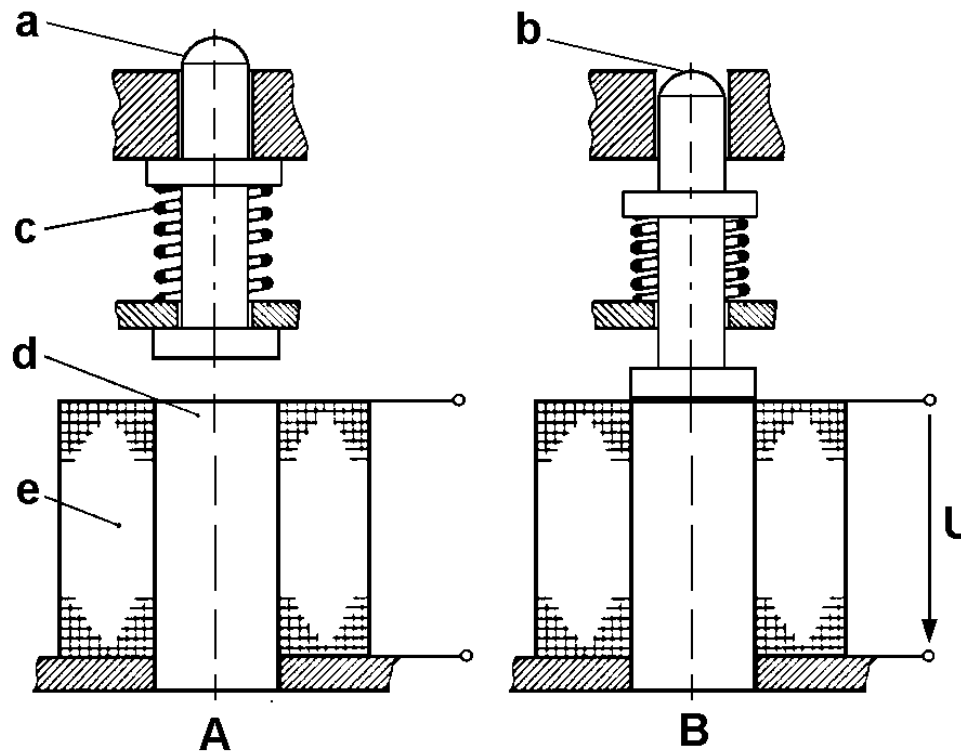
Technologies used for Braille Displays:

Electromechanical displays (obsolete)

Displays in piezo technology (today's technology)

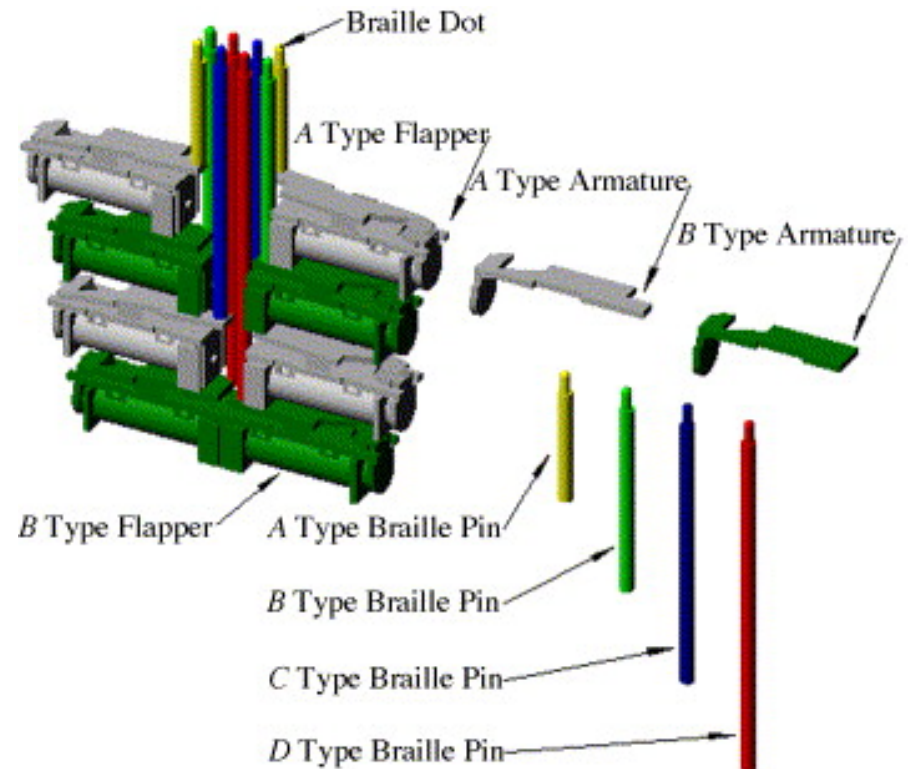
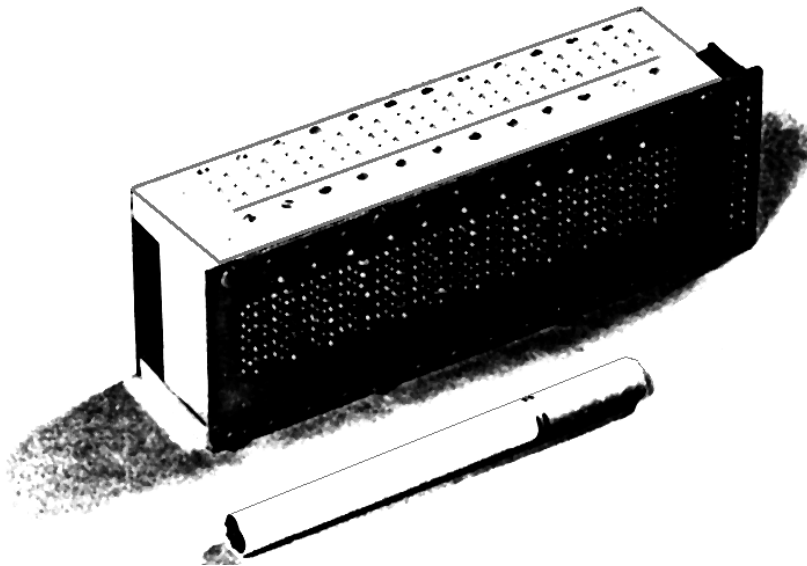
Electromagnetic Braille Display

Most simple construction



Electromagnetic Braille Display

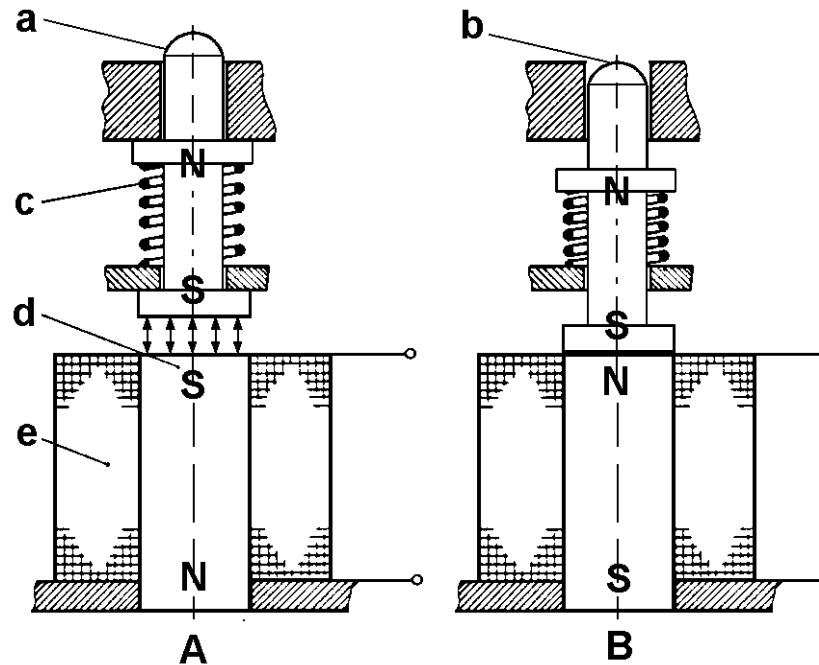
Examples



Electromagnetic Braille Display

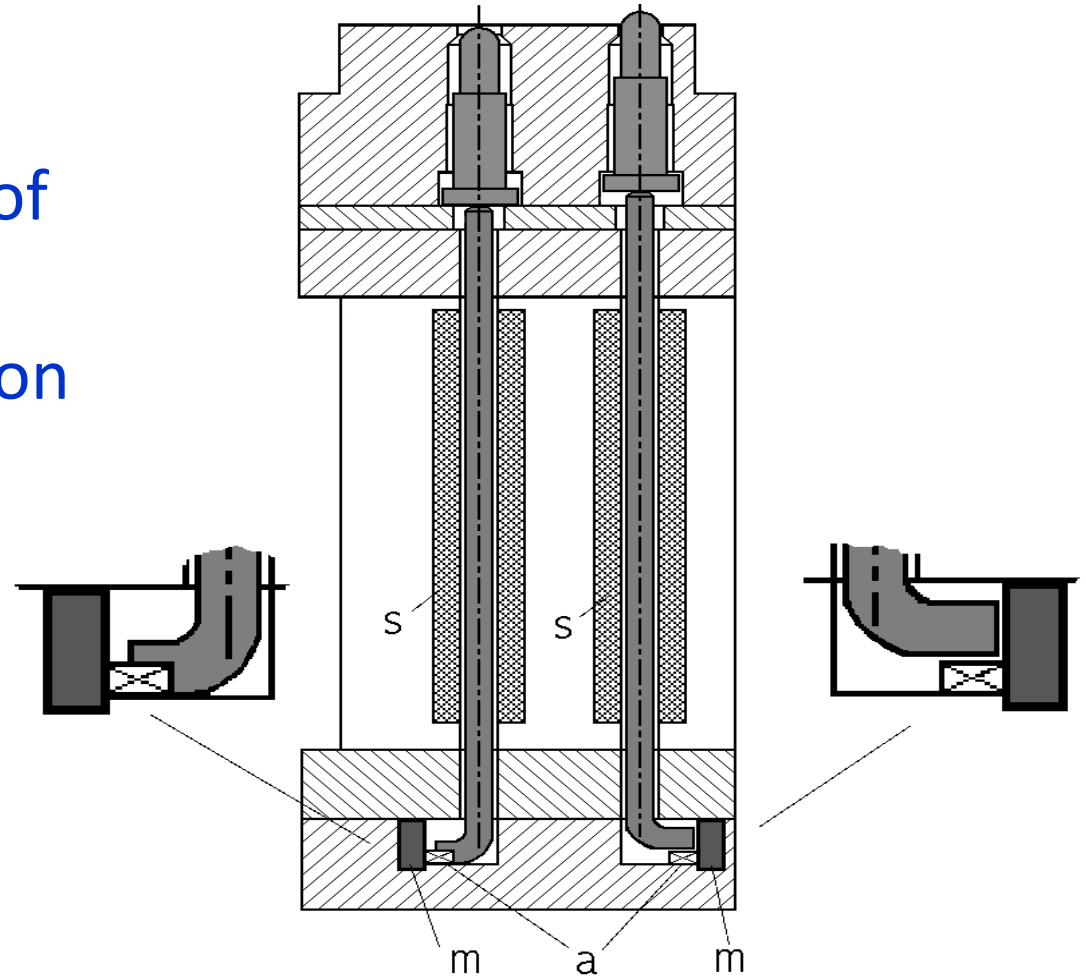
Bi-stable construction

Reversing a magnetic core



Electromagnetic Braille Display

Bi-stable design
Mechanical locking
Rotary movement of
the pins due to
changing polarization



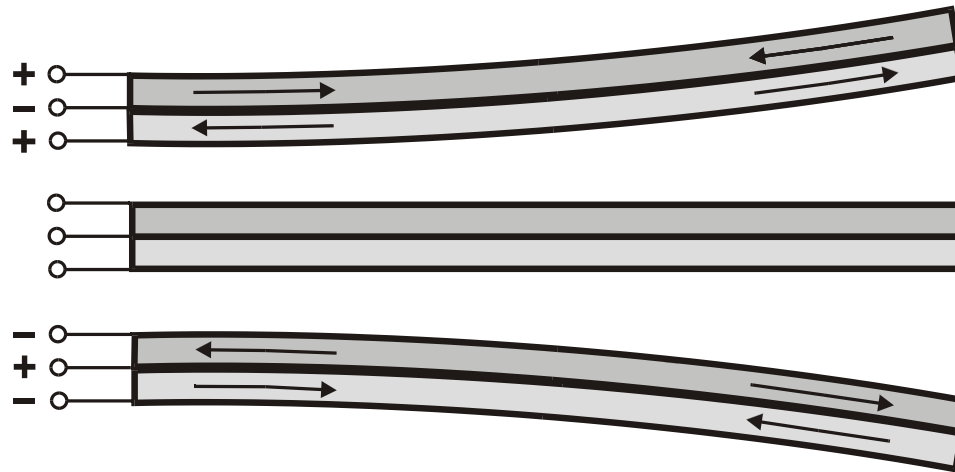
Piezoelectric Braille display

Is the current technology

2 strips of piezo ceramic glued together

Working principle like bimetal

Elongation and shrinkage depending on the polarity

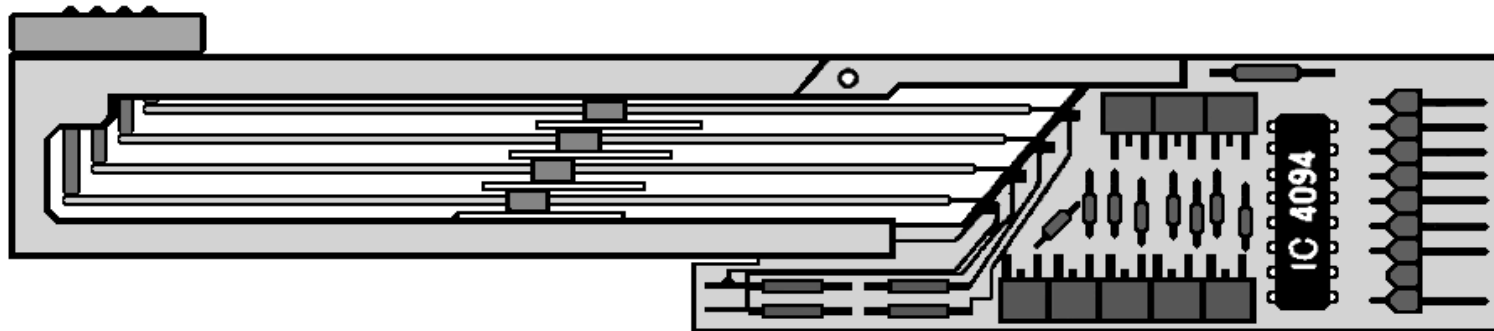


Piezoelectric Braille display

Exemplary construction of an 8-point display
2 rows of piezo ceramic strips in 4 levels



Top view



Side view

Braille displays

Disadvantages of today's technology:

- Expensive

- High space requirement

- Sensitive to pollution

- Only limited graphics capability

- High power consumption

- Not mobile usable



*Graphic Windows Professional,
24 x 16 dots, (HandyTech).*

Braille displays

New technologies (to be investigated)

- Shape Memory Alloys (metals with shape memory)

- Electroactive polymers

- Electrorheological (hydraulics, change in viscosity in the electric field)

- Electrocutaneous (electrodes act directly on the skin)

- Electrostatic (change of surface adhesion)

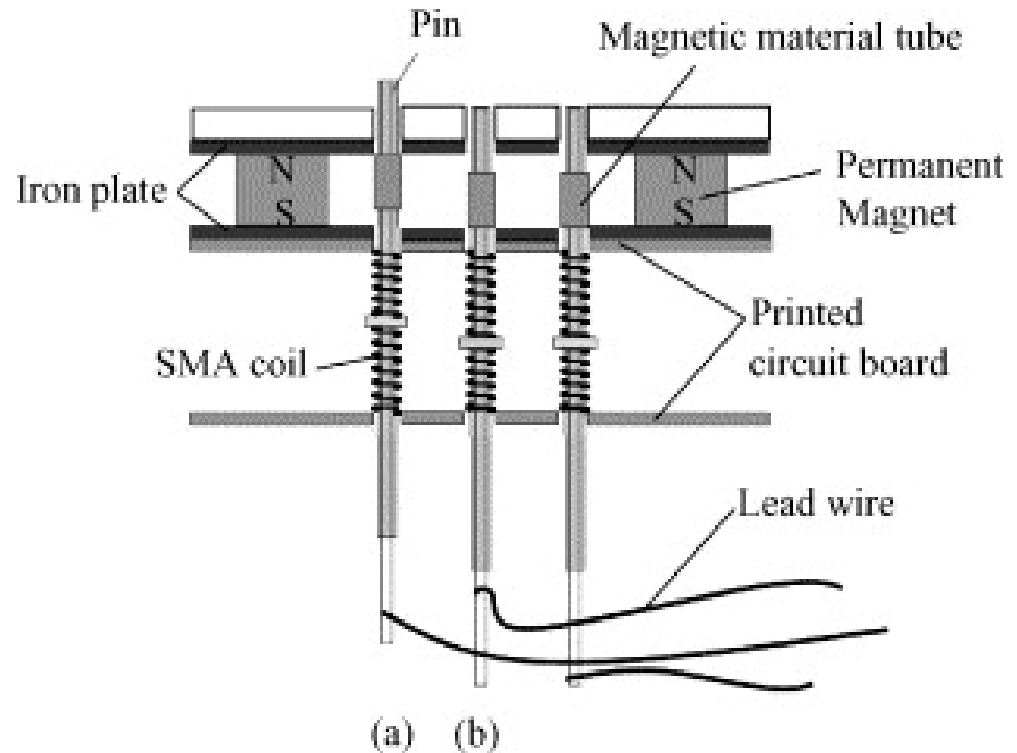
- Evaporation (principle of the steam engine)

- Electrochemical (vapor pressure by electrolysis)

Shape Memory Alloys – SMA

(Metal with shape memory)

e.g. Ni-Ti alloys

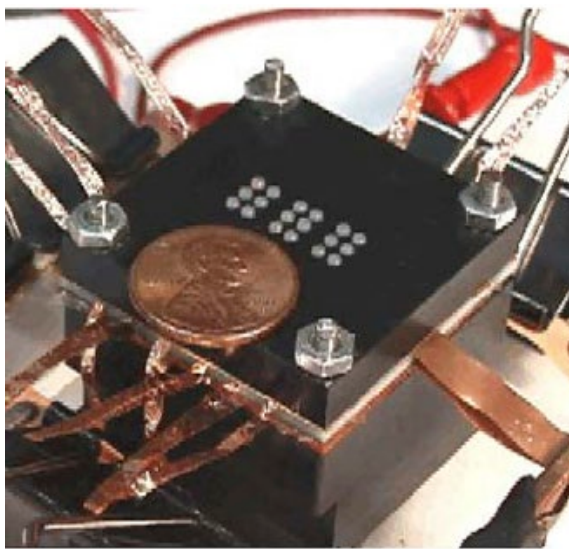
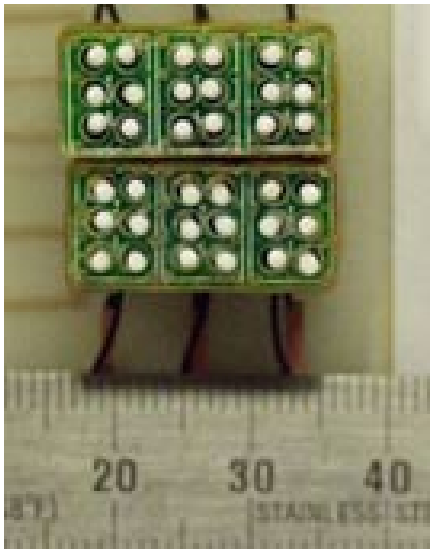


3. Tactile communication

3.7 Braille displays

Electro-active Polymeres

e.g. Polyvinyliden-Difluorid (PVDF)



Graphic Braille Displays (late 1970s)

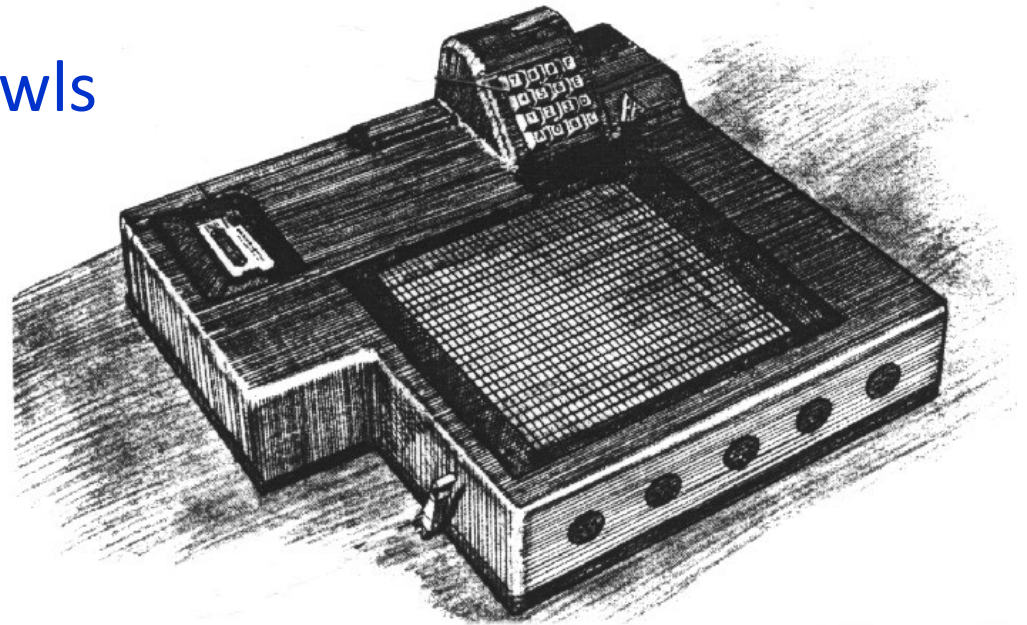
Rose Reader:

Control via bimetallic pawls

Delete - All pins down

Write - desired pins by
heating the pawl

Pushed by spring force
upwards

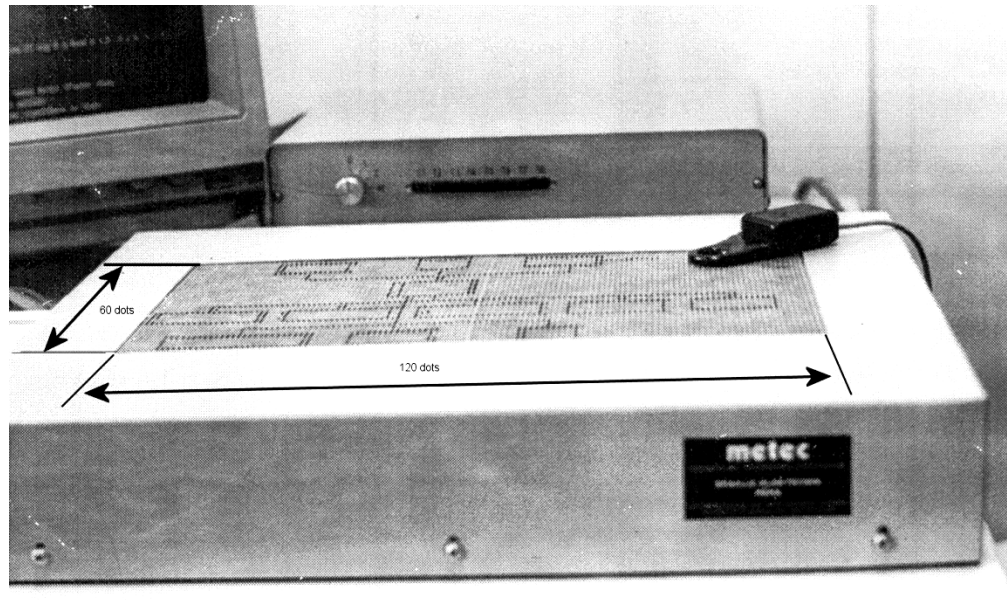


The "Rose Reader" tried to get away from the principle of individually driven styli. By means of a lever, all spring-loaded feeler pins could be moved to the lower position at once, where they got stuck on a pawl - the page was deleted globally. The pawls were made of bimetal and could be selectively heated. All stylus pins needed to display the next page were unlocked and pushed up to the active position by the springs. Due to the global deletion of the entire page, it was not possible to display a cursor or "scroll" the page. These restrictions did not allow for interactive work, such as on a screen or Braille line, so the principle could not prevail.

Graphic Braille Displays

Stuttgarter Stiftplatte (Mid 1990s)

60 x 120 = 7,200 points (3mm grid),
electromagnetic drive,
only 4 units were built,
very expensive (50,000 €), too voluminous



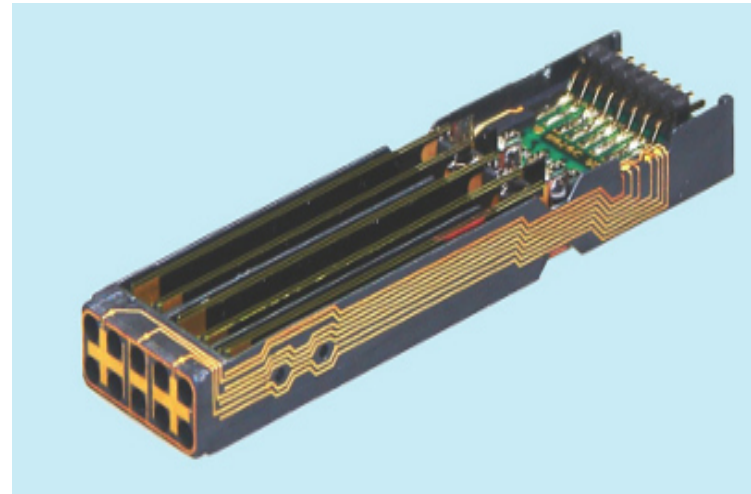
Graphic Braille Displays

Hyperbraille (late 2000s)

60 x 120 = 7,200 points

Pitch 2.5 mm

Piezoelectric drive, 10-point modules



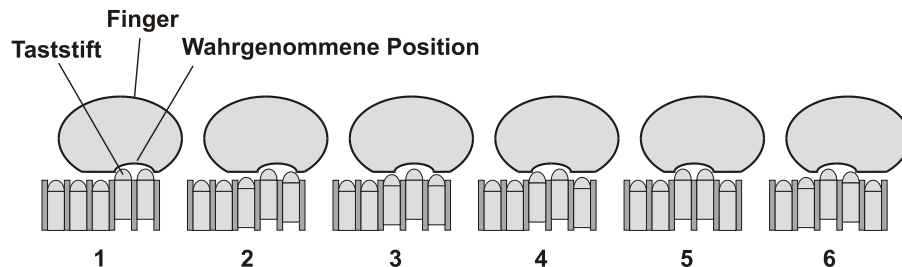
<http://hyperbraille.de/project/>

Virtual Braille Displays

Are moved with the finger (over the surface)

Only a few points

Problems due to lack of relative movement between groping finger and Braille cell



Pantobrilie - The two braille displays are mounted on the arms of a pantograph

Pantobrilie, a virtual solution, uses a combination of a haptic display (pantograph with force feedback) and a single-cell braille display, which is guided by the reading person on a virtual sheet. The pantograph reports the respective position of the display to the computer, which then carries out the adjustment of the styli corresponding to the respective location.

The reading performance achieved with this arrangement is hardly better than with a stationary single cell and remains far behind the reading performance with real braille lines or printed text. The advantage, however, lies in the fact that the user can better understand relationships and layout, because there is a direct correlation between letter and location

Full replacement for conventional computers / notebooks

Alternative input and output

Often no longer necessary these days

Because of screen reader and voice output

Lack of Braille skills

Smartphones

3. Tactile communication

3.8 Braille (Computer) devices

Notepads with Braille output

VersaBraille (Telesensory, USA)

12 braille shapes



Notepads with Braille output

Notex (Papenmeier, Deutschland)

20 Braille forms



Notepads with Braille output

Braille Note Apex BT 18/32 (HumanWare)

18 or 32 braille shapes



Notepads with Braille output

Braille Lite (Blazie Engineering, USA))

18 braille shapes



Notepads with Braille output

Active Braille (HelpTech D)

40 Braille shapes

Speech

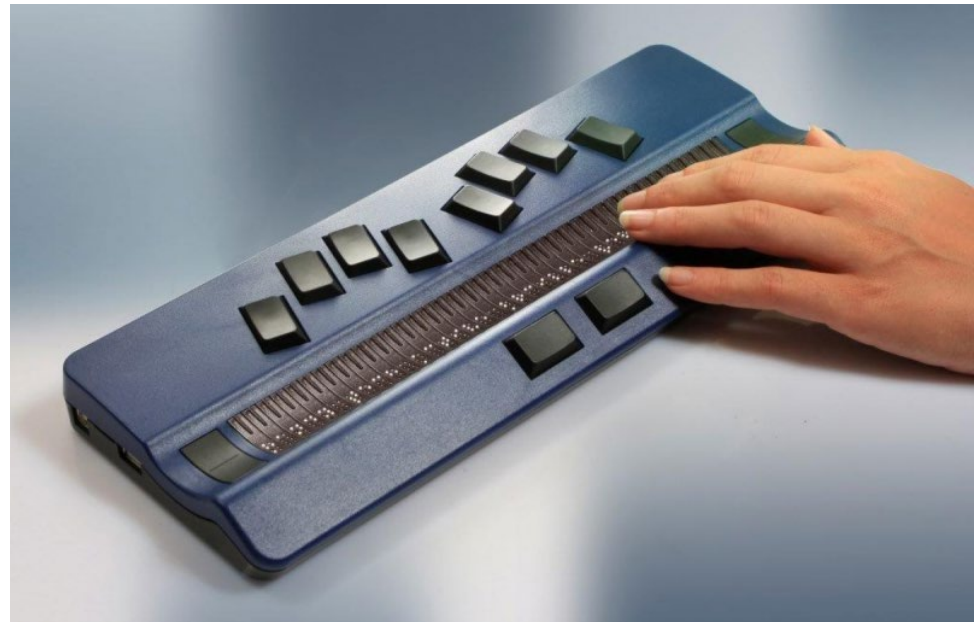
Braille "Frames"

HID

USB, Bluetooth

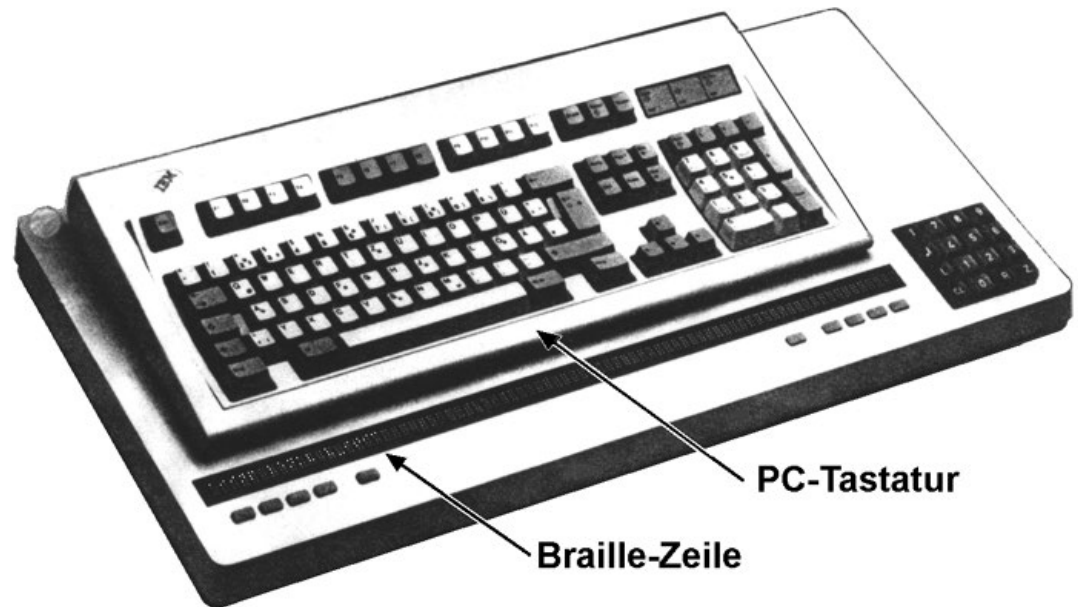
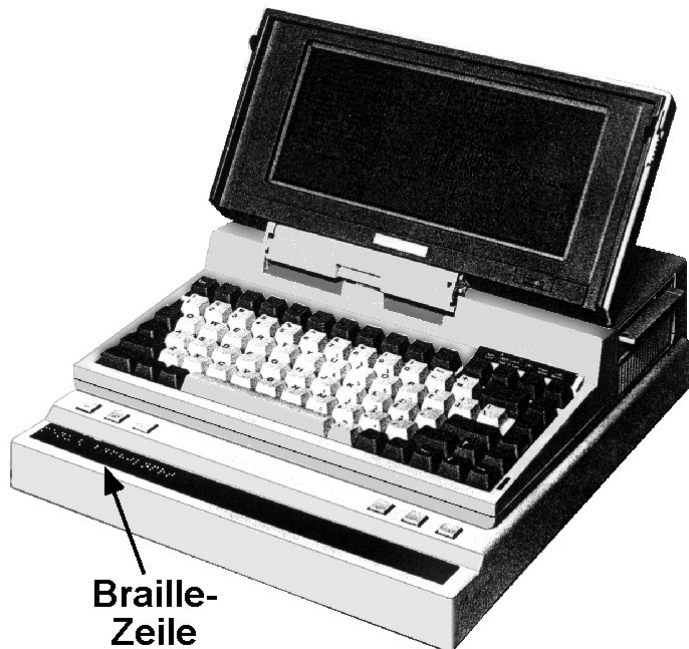
860g

20h battery



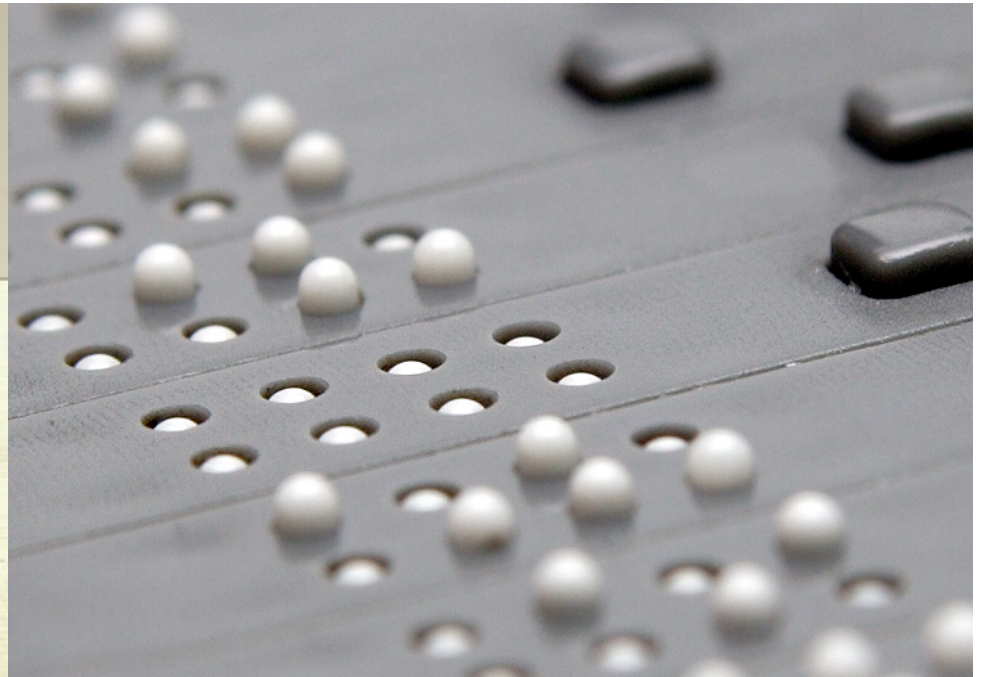
Braille PC accessories and notebooks

Displays with 40 to 80 shapes



Braille PC accessories and notebooks

Displays with 40 to 80 shapes



Notepads with voice output

Conversion of Braille shorthand in full text and language



The most cost-effective and most portable in weight and volume form for notebooks uses a Braille keyboard for text input and a speech synthesizer for output.

*Braille notepad with speech output Braille 'n Speak
(Blazie Engineering)*

Speech output

Converts screen content to spoken language

Navigation mostly like with keyboard

Now very good software, so it is also possible for blind people to use smartphones and computers.

Screen readers offer an advanced operating concept via the keyboard of computers.

Key presses are assigned by the screen reader with its own function.

They are supported by Accessibility APIs in the operating system.

The key "H" jumps e.g. to the next heading or Ctrl + Arrow_up jumps to the previous block element. Very few key commands are ever passed to the browser, such as the input, space or tab keys.

In order to be accessible (mandatory) Websites must fulfill some conditions (excerpt):

Operable with keyboard:

- Accessibility and operability of all active elements

- Focus Order

Avoid pure image content or explain with "alt" text

Do not mark elements by color alone

Hierarchical (not merely optical) structure

Assignment of semantic hints (role attribute) from the WAI-ARIA specification.

See special lecture "Barrier-free Internet".

Web page navigation shortcuts can also be assigned using the accesskey attribute for a link or page control.

```
<li><a href="#mainnavigation"  
accesskey="m">To main navigation</a></li>  
<li><a href="#tree"  
    accesskey="t">To tree structure</a></li>  
<li><a href="#content"  
    accesskey="c">To content</a></li>
```

That way content can be specifically jumped to.

Screen reader videos

Example of navigating through the website of an online newspaper using screen readers.

https://www.youtube.com/watch?v=xpP_Km5L46E

Duration: 1 minute

It is clearly visible that an overview over the website is not achieved.

Example: "Jaws", "NVDA" (free), "Dolphin"

3. Tactile communication

3.10 Excursus: Use of works/conversion

In principle, every "work" should also be accessible in barrier free format, e.g. in Braille, or it should be possible to bring it into this form.

Often, however, the authors have neither the necessary know-how nor are they interested in carrying out the conversion themselves.

Disability organizations offer some conversions, but must "acquire" the rights one by one, i.e. negotiate individually and there is no right to get them.

Copyright problem when making material accessible =>

Copyright amendment 2015 (result of Marrakech Conference) -
meanwhile ratification also by EU and US (about 50 countries)
decided, national implementations to follow...

General permission for use of works by authorized organizations
and cross-border exchange of works in formats that are accessible
to people with disabilities (but still necessity to clarify details with
right holders in each case).

Importance somewhat decreases thanks to Internet.

=> Enables online catalog with 400,000+ titles

<https://www.accessiblebooksconsortium.org/globalbooks/en/#>

3. Tactile communication

3.11 Excursus: Apps and Services for blind people

Innovative apps for blind people (examples)

"Seeing AI" app from Microsoft (currently only iOS)

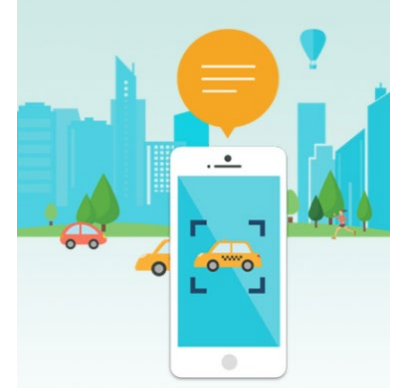
Describes content of the camera image in synthetic language. Before you have to choose mode: recognize document, recognize person and their mood, read bar code and describe product, recognize US dollar note,

<https://www.microsoft.com/en-us/seeing-ai/> (in English)

https://www.youtube.com/watch?v=bqeQByqf_f8 (in English)

(Duration: 1:30 minutes)

<https://www.golem.de/news/seeing-ai-microsoft-app-liest-umgebung-fuer-blinde-vor-1707-128945.html> (in German)

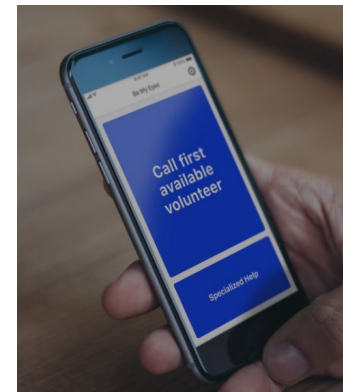


"Be My Eyes" App (Android, iOS)

Smartphone owners (registered as volunteers) receive a video call from blind people from their smartphone. The sighted volunteers tell the blind people what they see on their smartphones.

<https://www.hilfsgemeinschaft.at/app-test-be-my-eyes> (in German)

<https://youtu.be/6GRfFuWsJNU> (in English, Duration: 1:30 minutes)



Innovative apps for blind people (examples)

"**BlindSquare**" navigation app with environment description (iOS) which has its own speech output. It not only provides directions but also informs about intersections, street names and POIs (points of interest) in the area.

<https://www.hilfsgemeinschaft.at/app-test-blindsquare> (in German)

Surveys: (in German)

<https://www.test.de/Apps-fuer-Sehbehinderte-und-Blinde-Lotsen-fuer-das-Unsichtbare-5033370-0/>

<https://www.blindenverband-wnb.at/aktuelles/braille-report/hilfsmittel-smartphones/>

3. Tactile communication

3.11 Excursus: Apps and Services for blind people

"RoboBraille" service (web and email)

Service that automatically converts and accesses electronic documents in a variety of alternative formats for people with low vision or reading and writing disabilities.

features:

Audio: Conversion of synthetic language documents such as MP3 or DAISY files

Braille: Conversion of Braille and Braille documents

Ebook: Documents can be converted to both EPUB and mobi (Amazon Kindle) formats

Accessibility: Conversion of inaccessible PDF or image files

Is an email and web based service

In existence since 2004, is free for non-commercial applications

Promotes self-employment of disabled people in education and in the labor market

Conversion options for documents can also be integrated into library and learning management systems (fee-based for organizations)

<http://www.robobrace.org> <https://youtu.be/gQzsljYiLEI> (duration: 4 minutes)



4. Picture and Symbol Languages

4.1 Basics

Assisting persons with disabilities in reading and / or writing.

Also for people with poor reading skills (illiterate, foreign language).

The terms *pictorial writing* and *pictorial language* are mostly interchangeable in the context of the AAC ("Augmentative and Alternative Communication"), because these "writings" are used as an alternative "language".

The human language is in its essence "not iconic", so not pictorial.

By and large, however, our words are arbitrarily assigned to the terms that designate them.

Therefore in the individual languages this is often completely different.

Visual languages

Advantages: language independence, universality

Problems: no direct transferability, less expression possibilities

Brainpower is necessary when working in a visual language to remember:

what a particular symbol does mean

which symbol to use

where the relevant symbol can be found (for example, when using a symbol board, symbol folder or keyboard)

Design of visual languages

The proportion of the basic vocabulary in the overall communication is relatively large

Size of base vocabulary	Proportion of total communication content	
	Children (Pre-school)	Adults
50	60%	40...50%
100	73%	60%

Vocabulary (approximation)

	Vocabulary
Child at 1.5 years	50
Child at 2.5 years	400
Child at 3 years	700
For everyday text at least necessary	2.000
Child at 6 years (passive)	23.000
Adults (active)	18.000
Adults (passive)	94.000
Total for German language	300.000+
Total for English language	400.000 - 600.000

Design of visual languages

Easy for image-generating words

Here, a term can be immediately assigned a pictorial expression (tree, house, money ...)

Difficult for non-image-generating words

A term must be paraphrased or expressed with an abstract symbol (e.g., work, gross national product)

Types of symbols

- [1] Pictographic or iconographic symbols
- [2] Ideographic symbols
- [3] Arbitrary symbols

[1] Pictographic or iconographic symbols

Creation of (simplified) illustrations of real objects

Abstract and grammatical contents can not be expressed

Example from the symbol language REBUS



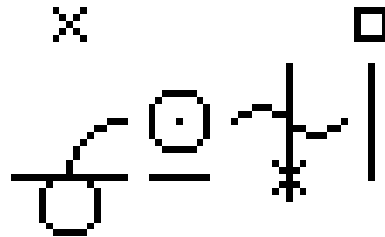
[2] Ideographic symbols

Mostly stylized symbols for a (even abstract) concept

Pictorial mediation of an idea

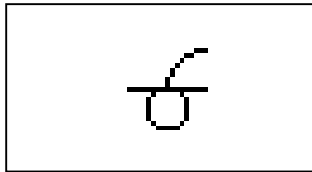
Hieroglyphs, Chinese characters

Guess example from "Bliss" (see later):

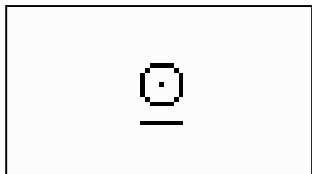


Solution:

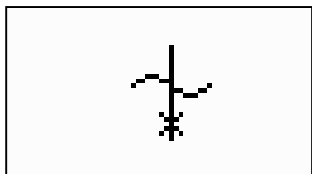
Pommes frites (= chips)



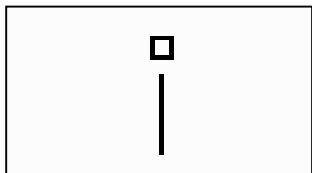
- stands for under the earth growing fruit (fruit under the "earth line")



- stands for color



- stands for snow

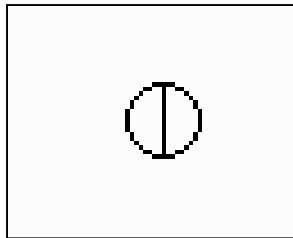


- stands for an elongated object

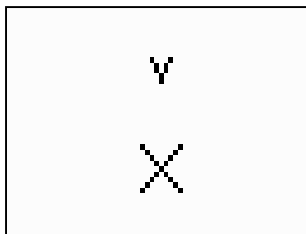
[3] Arbitrary symbols

for terms for which neither pictographic nor ideographic symbols can be found

Examples from "Bliss"



➤ Stands for life



➤ stands for much

Application of image communication

Where there is no understanding of text due to disability.

"Spelling skills" and "reading skills" can be different.

In case of speech impediment to communicate faster ("1 picture for 1000 words")

Great scope in meaning

"TREE" can mean tree, wood, forest, maybe trip or Christmas...

Overview of image communication systems

Rebus:

Symbol catalog with around 5,000 symbols

Combination with letters possible

Simple grammatical symbols included

Aladin and PictureCommunicationSymbols (PCS):

Detailed, often very situational (ie little generalized) images





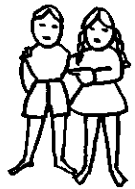




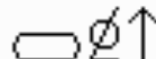




Bliss

Very complex and powerful picture language

Makaton

Combined with gestures

Comparison Rebus, PCS, Aladin, Bliss





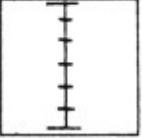





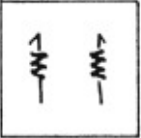














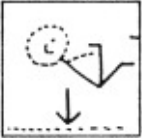



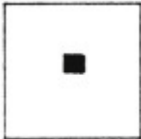


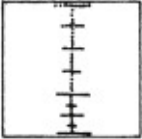






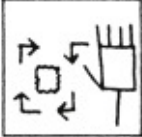


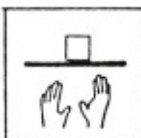



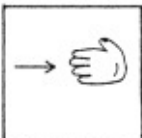


	REBUS	PCS	ALADIN	BLISS
Bruder / brother	 brother	   oder		
Kuchen / cake	 cake			
Getränk / drink	 drink		 2)	

Comparison of the symbolic languages Rebus, PCS, Aladin and Bliss

2) Aladin offers very concrete but often no general terms

4. Picture and Symbol Languages

4.1 Basics – more examples

	PCS	Oakland	Rebus	Sigsymbols	Picsyms	PIC	Blissymbols
BIG							
COLD							
DIRTY							
FALL							
LITTLE							
MAKE							
WANT							

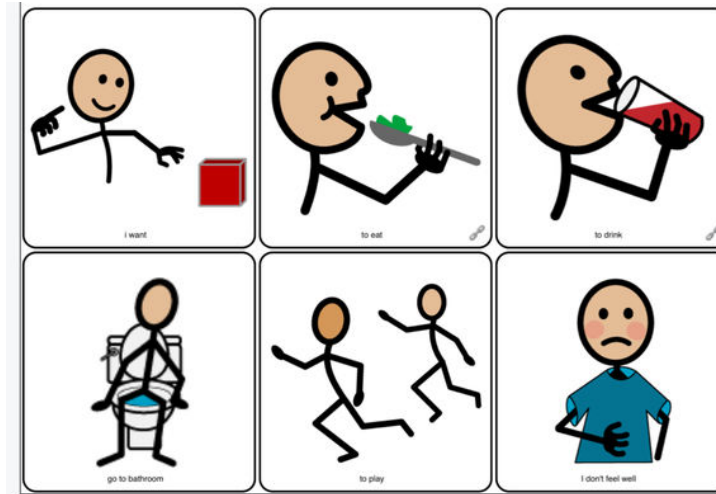
From: Blackstone S.,
Augmentative
communication,
Rockville, MD: American
Speech Language
Hearing Association,
1986.

4. Picture and Symbol Languages

4.1 Basics – more examples



Boardmaker
(uses PCS)



Symbolstix

METACOM



Systems with gestures

Useful not only for deaf people

The additional stimulus (bimodal communication) supports people with learning disabilities

Advantage: Signs do not need any further aids (such as symbol boards, computers)

Disadvantage: Signs are harder to learn for both communication partners than pictorial symbols

Makaton

350 basic elements, based on the BSL (British Sign Language).

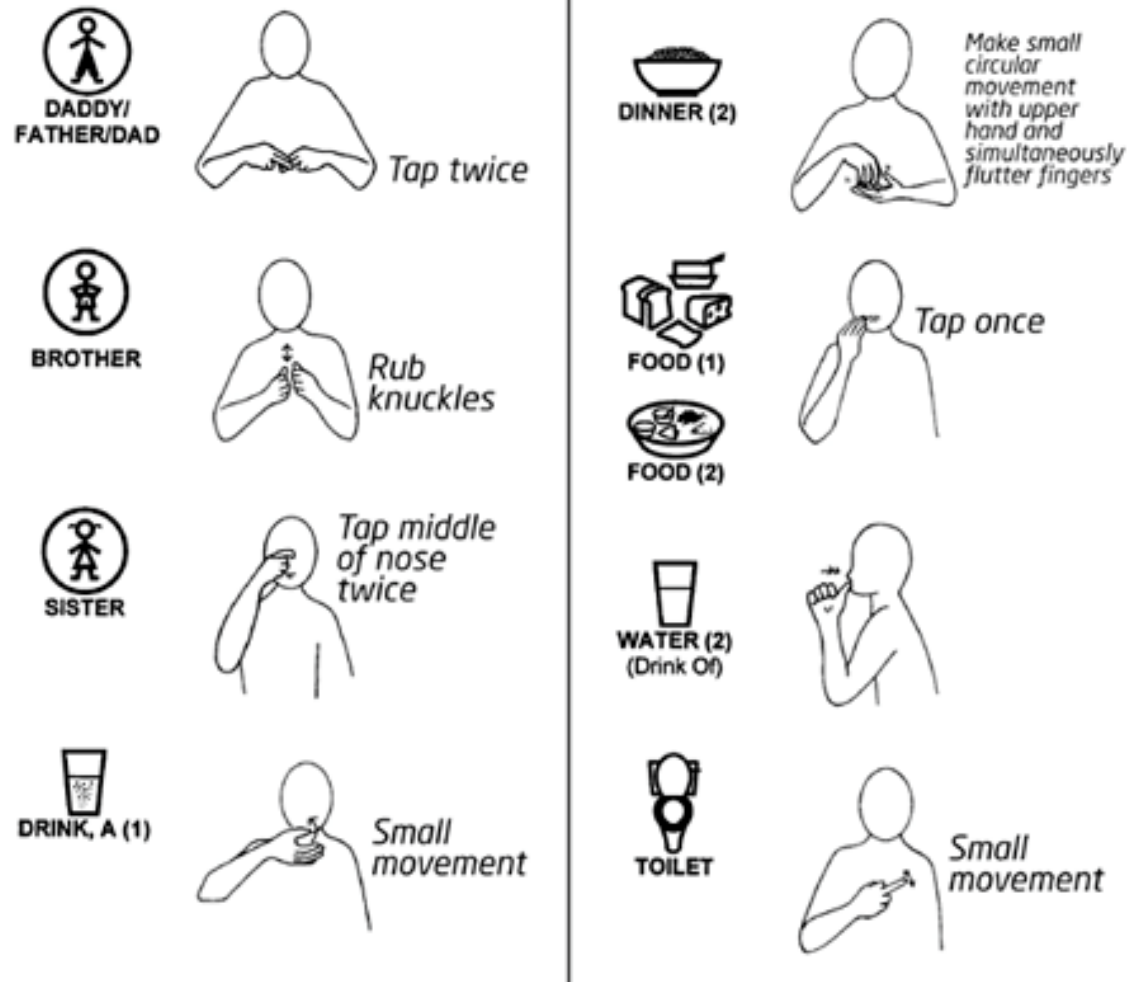
Special feature of Makaton: In addition to the gestures (as hand positions), these gestures are also available as drawn pictorial symbols

Makaton

The special feature of Makaton is that it also gives these gestures as drawn symbols in the form of a picture language.

Using the same symbols can be communicated either via gestures (hand positions) or via a symbol board.

It is therefore quite possible that the non-disabled person speaks to the disabled person and accompanies the individual words with Makaton gestures, while the disabled person responds by pointing to the Makaton symbol plate.



History

Karl Blitz (Charles Kasriel Bliss) 1897-1985.

He grew up in Chernivtsi (now Ukraine), in a region of k.u.k. Monarchy, on the border to the Russian Empire, in which lived 20 different nationalities, who were often hostile to each other because of different languages.

Dipl.-Ing. Blitz **studies chemistry at the TU Vienna (!)**

1938 deported to the Dachau concentration camp and then Buchenwald.

Further stations after release: Great Britain, Romania, Greece, China (Shanghai).

History

In Shanghai, Karl Blitz became aware of the Chinese characters.

A Chinese teacher told him that Chinese texts can also be read by people who can not speak with each other for linguistic difficulties.

He learned some Chinese characters.

After the war, he emigrates to Australia.

History

1949: "Semantography - One writing for one world"

1965: 2nd edition: "Semantography - A logical writing for an illogical world"

Should actually serve the international understanding.

In 1971, a Canadian disability organization saw the possibility of using semantography for the communication of spastic paralyzed children.

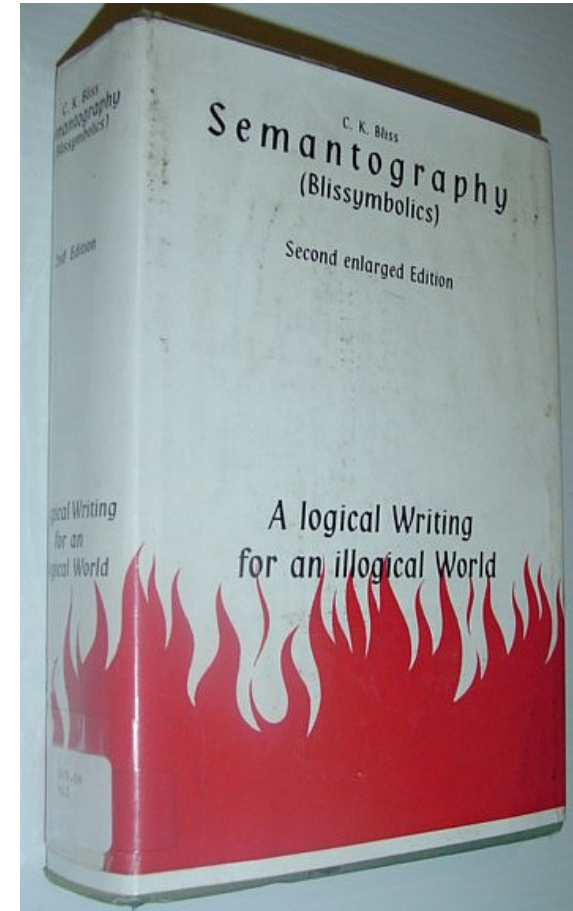
In 1975 he granted the Canadian Blissymbolics Communication Foundation an exclusive license to use his symbols.

4. Picture and Symbol Languages

4.2 Bliss

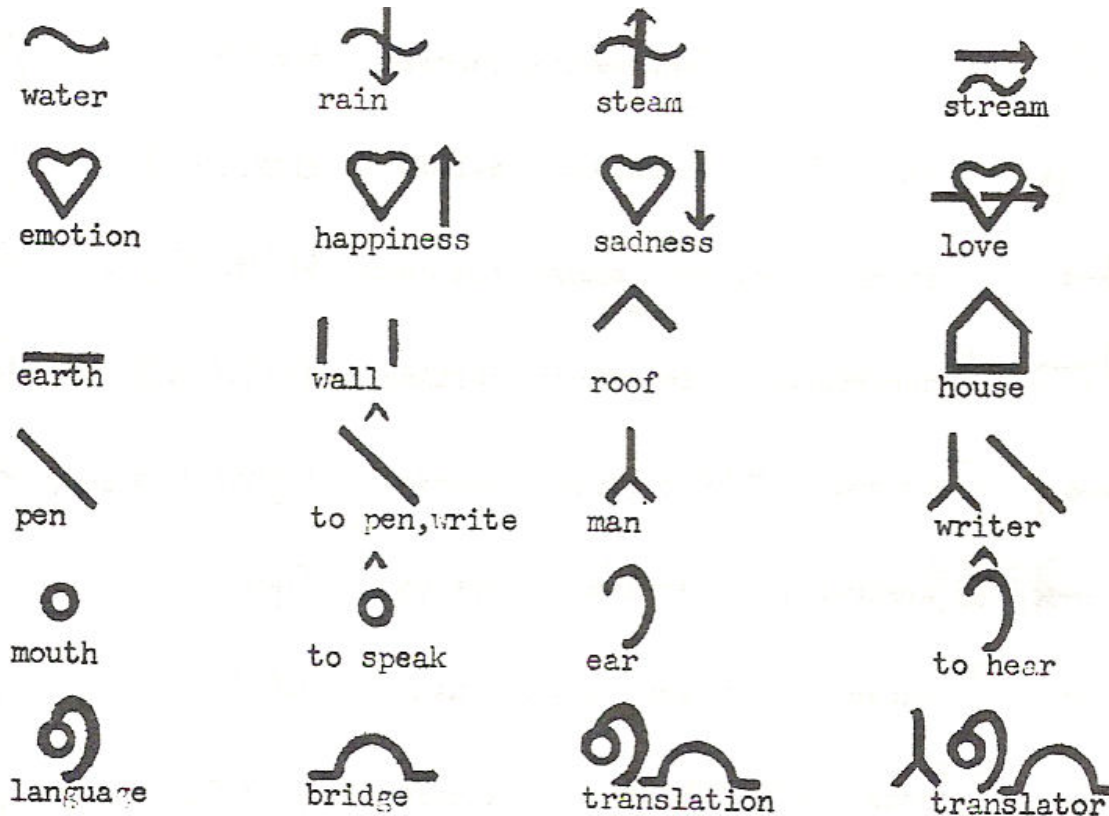


Karl Blitz (Charles Kasiel Bliss) 1897-1985.



C. K. Bliss: „Semantography – A logical writing for an illogical world“, 2nd edition, 1965

Original page from 1965
















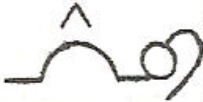

















4. Picture and Symbol Languages

4.2 Bliss




































NOT "SELF-EXPLANATORY." THEY ALL NEED TO BE STUDIED

125

Symbol elements and meaning	Derivation and combination examples and their respective meanings					
 ear hearing	  ear	  to hear	  auditory	 listen!	 music (note)	 listener
see special chapter p. 288 and index also p.360	 news (eye & ear)	 page (see later)	 newspaper	 language (mouth & ear)	 bridge	 bridging lan- guage, translate
	 earth (see later)	 sound noise	 loud noise	 bang, crash	 telephone	

 nose smell see p. 289 and index	  nose	  to smell	  olfactory	 odor, smell (nose & earth)	 sky (see later)	 air
--	--	--	---	--	---	--

Derivations from base symbols

<p> mouth speech</p> <p>see special chapter p.291ff and index</p> <p>p.289 and index</p>	<p> mouth</p> <p> to speak tell, say,</p> <p> verbal</p> <p> discussion</p> <p> speaker</p> <p> cry</p> <p> shout</p> <p> yell</p> <p> song (musical note)</p> <p> greeting (speech at meeting)</p> <p> admittance yes! (positive)</p> <p> denial (no, negat)</p> <p> speechless (minus s)</p> <p> open speech (publicly)</p> <p> secret privat</p> <p> private secretary</p> <p> food (mouth & earth)</p> <p> to eat</p> <p> taste</p> <p> breath</p> <p> to exhale</p> <p> spitting etc.</p>
<p> hand touch</p> <p>p.290,291 and index</p>	<p> hand</p> <p> to touch</p> <p> tactile</p> <p> slap</p> <p> hit</p> <p> punch</p> <p> tool, instrument (thing in hand)</p> <p> lifter jack</p> <p> musical instrument</p> <p> electrical tool</p> <p> telephone apparatus (mouth & ear)</p>

... how it went on

Only discovered in 1971 as a communication system for disabled people.

Today in use in 33 countries and 15 languages.

Also as a tool for later learning text communication.

“Natural languages are mainly oral, while Blissymbols is just a writing system dealing with semantics, not phonetics.” [Wikipedia]

Concept

Based on 9 basic forms from which (currently) approximately 2,500 official terms (registered by the "Bliss Communication Institute" in Canada) have been formed

Size, location and orientation of the elements determine the meaning.

As with other living languages, there is ongoing development.

However, new symbols can be formed from existing components so that readers can recognize the meaning of a new symbol from the analysis of the components used.

For this purpose, the reader must know the meaning of around 120 key symbols in order to deduce the meaning of all other symbols.

Concept (continued)

The strengths of Bliss include the presence of symbols for:

- Tenses: past - present - future

- Question and command form

- Proprietary pronouns

- Singular and plural (plural markers)

Bliss symbols, like the letters of a word, are combined into concepts and subsequently term by term into sentences.

Bliss consists of pictographic and ideographic elements.

Added to this are "arbitrary" symbols (neither pictographic nor ideographic) that were created simply because they were needed.

Formation of terms from key symbols

The most important terms or concepts are represented in Bliss by about 120 key symbols (English key symbols).

How other terms can be formed from these key symbols is represented for the words "friend," "teacher," and "pet."



Person + feeling + positive = Friend



Person + Container + up + Knowledge = Teacher



Animal + Feeling = Pet

Structure of the Bliss language

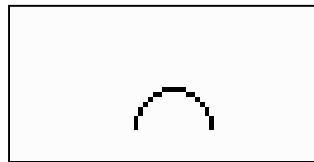
The basic form can be changed by "indicators".

The symbol becomes a noun, adjective or verb.

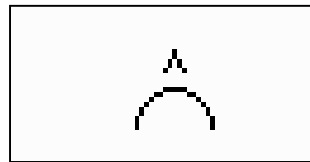
"Accents" form the time form of verbs (past, present or future), for nouns the plural.

Example of using accents

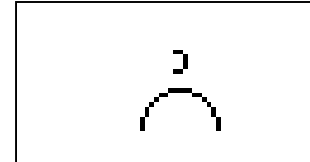
As a basic form the symbol for mind



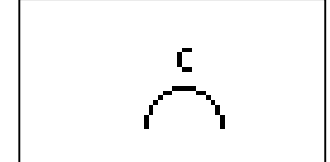
mind
base form



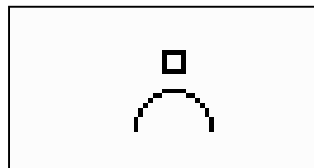
to think
verb



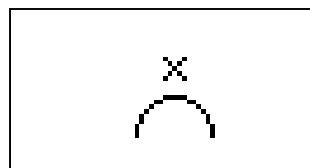
thought
past



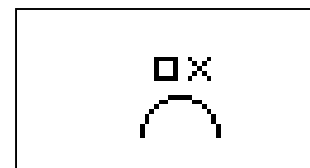
will think
future



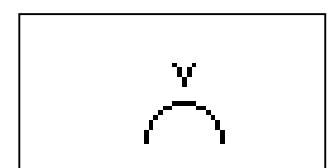
brain
noun



thoughts
plural



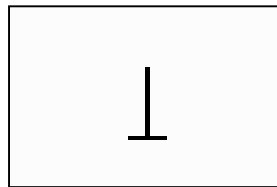
brains
noun/plural



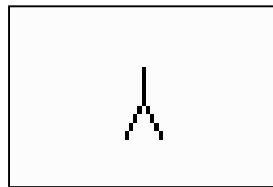
thoughtful
adjective

Persons

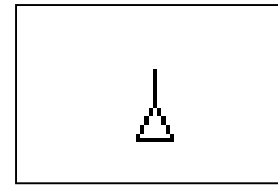
Bliss knows the gender-neutral form in addition to male and female form



Person



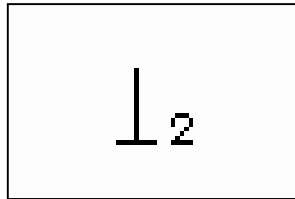
Man



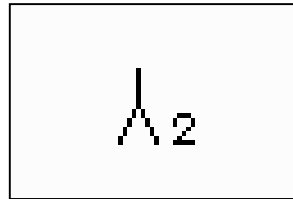
Female

Formation of personal pronoun in Bliss

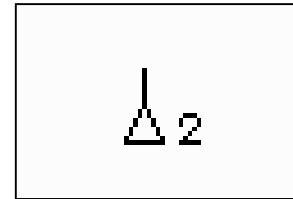
by adding a number



you
neutral



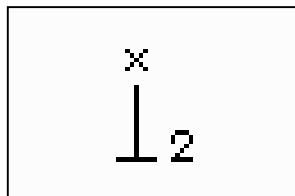
you
male



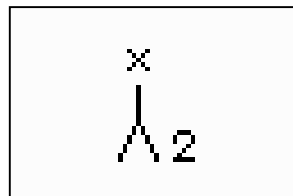
you
female

By adding numbers to the character "Person" the personal pronouns are formed.

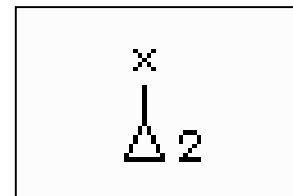
The symbol "person" extended by the number "1" forms the personal pronoun "me", "me", with number "2" results "you" and "you" etc. The accent "x" forms the plural.



You pl.
neutral



You pl.
male

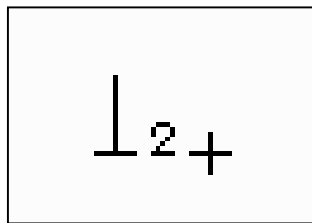


You pl.
female

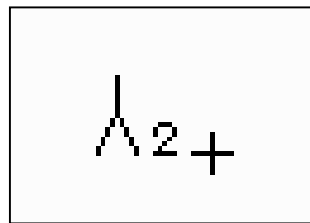
Formation of Possesiv pronoun in Bliss

is formed from the personal pronoun

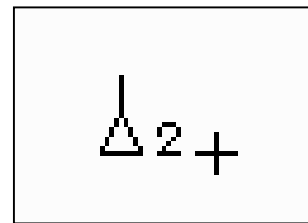
a "+" indicates that something belongs to the person



your
neutral



your
male



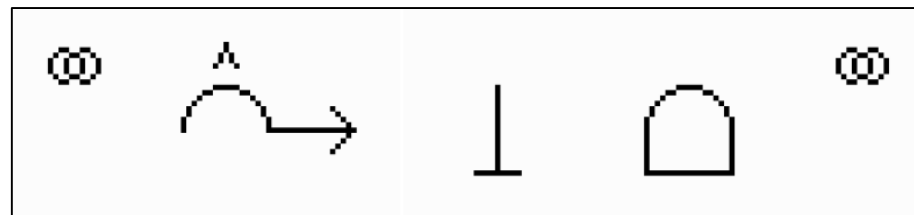
your
female

A subsequent "+"
(indicates that something
"belongs to the person")
makes the personal
pronoun the associated
possessive pronoun

Generating bliss symbols yourself

Own symbols are made by combination and included by the "combination indicator". The Combination Indicator is only required for your own (personal) creations and indicates that this term is not (yet) an official Bliss symbol found in the standard vocabulary.

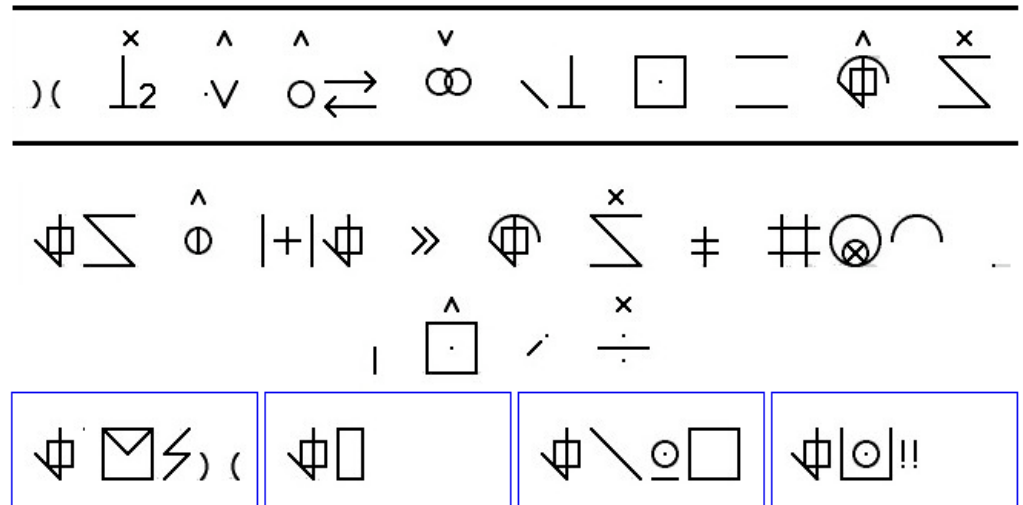
For example, the standard vocabulary does not have the term "introduce". A self-selected sequence of characters, marked as such with the "combination indicators", could arise from the following consideration: Introducing means leading a person to knowledge "CI" + "lead" + "person" + "knowledge" + "CI"



Self generated Bliss symbol „introduce“

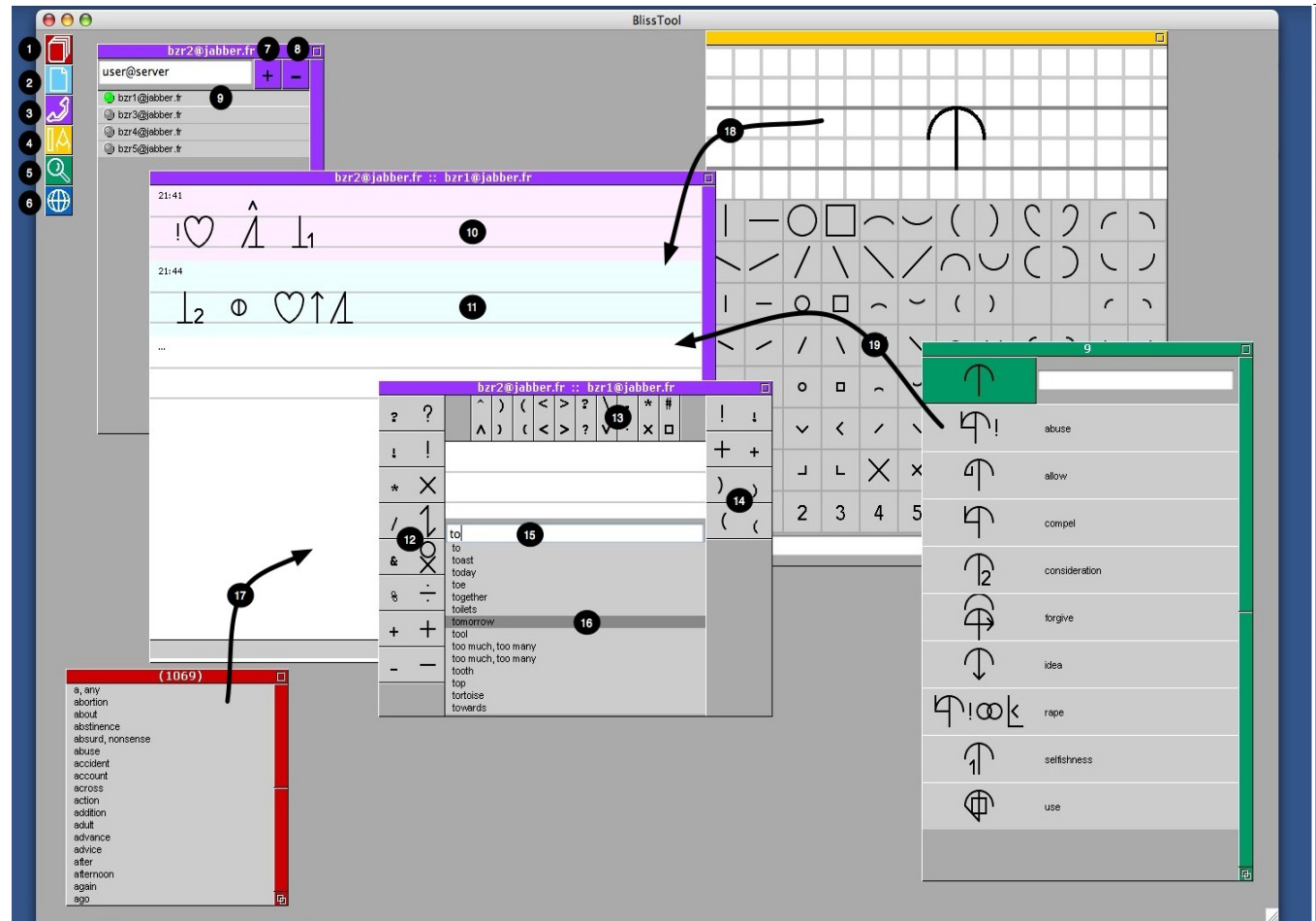
Bliss Tool (in Java)

„With BlissTool you can now chat with anybody in the world regardless of their native language!“



Source: http://jfbouzereau.free.fr/BLISS/bliss0_bl.html

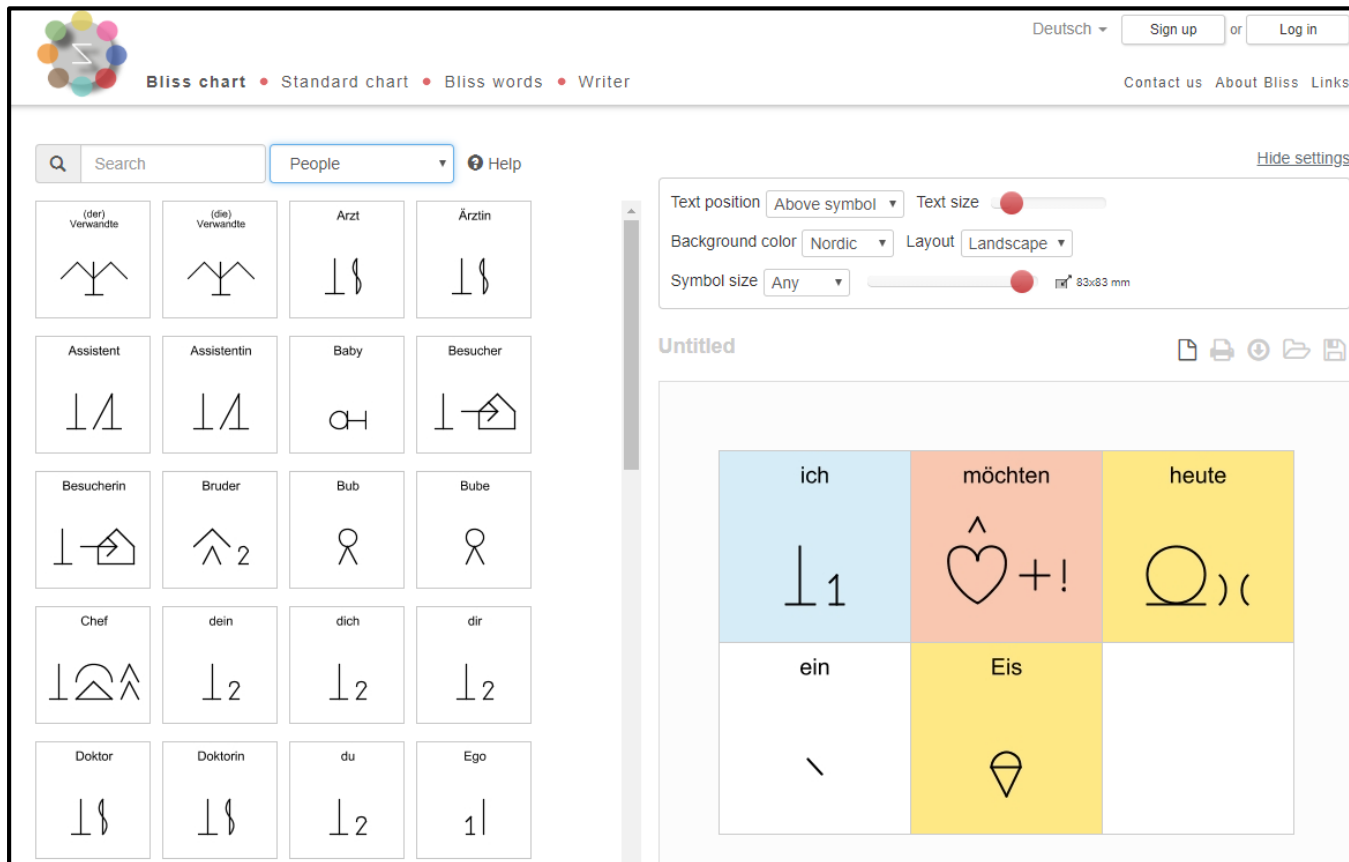
Bliss Tool Screenshot



4. Picture and Symbol Languages

4.2 Bliss

BLISSOnline <https://www.blissonline.se/chart>



Bliss chart • Standard chart • Bliss words • Writer

Deutsch Sign up or Log in

Contact us About Bliss Links

Search People Help

Hide settings

Text position: Above symbol Text size: [slider]
Background color: Nordic Layout: Landscape
Symbol size: Any [slider] 83x83 mm

Untitled

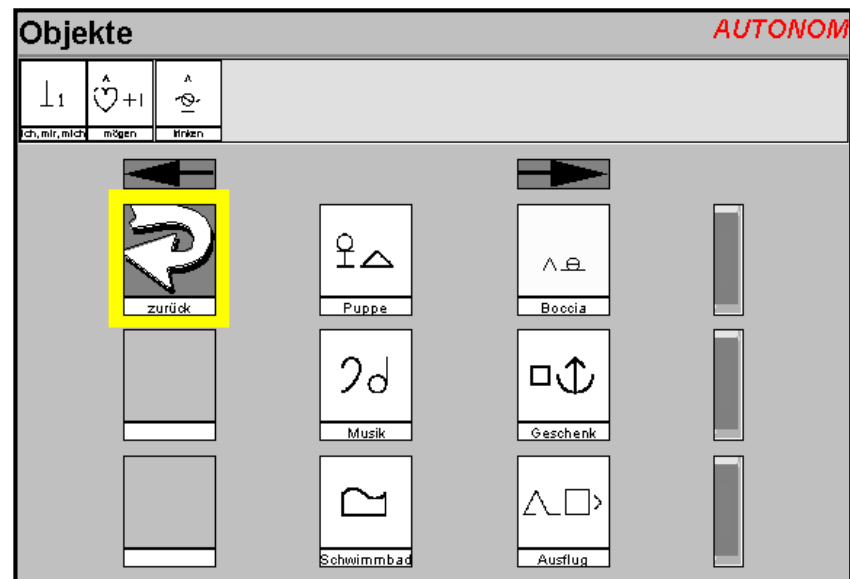
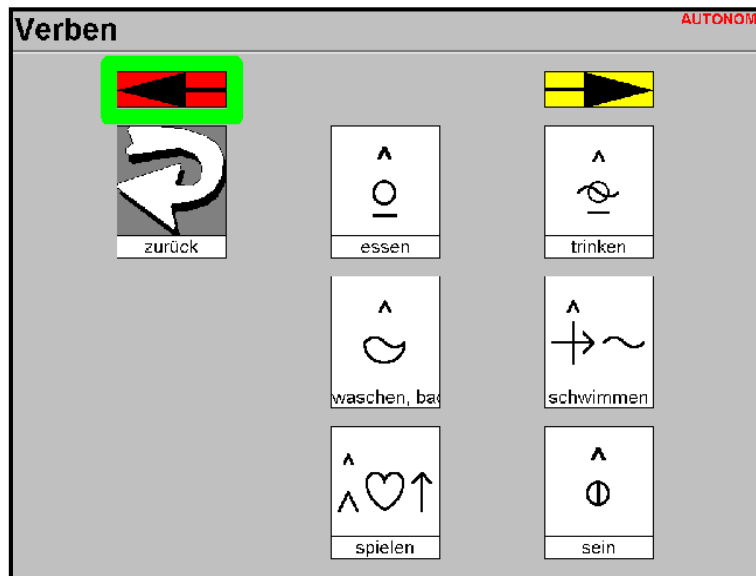
ich └ 1	möchten ^ ♡ + !	heute ○) (
ein \	Eis 🍦	

Attention, there are probably still errors / inaccuracies in the translation to the German written language, e.g. at "you", "yours", etc.

BLISS application <https://www.aat.tuwien.ac.at/autonom/beispiel/index.html>

The small icons in the first line can be scrolled within this AUTONOM menu. The "back" icon allows you to jump to the superordinate menu, from which the other BLISS menus "People", "Adjectives", "Objects", "Strategies" can be reached.

The selected BLISS symbols are collected in an editor line and can be pronounced and / or printed from there.



4. Picture and Symbol Languages

4.3 Excursus – AAC

"Augmentative and Alternative Communication" (AAC)

[German: "Unterstützte Kommunikation" (UK)]

Objective: To improve the communicative possibilities of people with difficult to understand or missing spoken language

The user group of non (understandable) speaking people includes: Children, adolescents and adults, both with congenital and traumatically acquired speech and language impairment

Discrimination:

"Augmentative": supplementing the spoken language

"Alternative": replacement of the spoken language

Both should improve the communication between the communication partners

Further distinction:

AAC as a means of expression in people with good language understanding

AAC as a temporary measure to support language acquisition

AAC as the (only) means of communication for mentally severely disabled people

AAC concept distinguishes:

Body's own communication form (gestures, facial expressions, eye movements, gestures)

External communication form (communication boards, books, folders and electronic communication aids (called "talker"))

Suitable forms of communication complement one another: People who communicate via AAC can, e.g. use communication board and a talker and use their own gestures to communicate.



Since many AAC users do not yet / no longer have sufficient reading ability, often symbol-based AAC is applied

4. Picture and Symbol Languages

4.3 Excursus – AAC

AAC is used...

... in addition to speech therapy
intervention

... as an independent funding concept

Challenges:

Extremely reduced communication
speed

Dominance of the communication
partner

Barely bridgeable asymmetry in the
conversation

In symbol-based communication, the
interlocutor is often also in a dual role

(a) as a co-designer who verbalizes
the content / messages and

(b) as a conversation partner

Therefore, it is important to reflect
critically on one's own speech
behaviors in conversation with
assisted communicating people

AAC & participation:

For people who can communicate in
sufficiently in spoken language,
improved communication is a very
important step towards participation
in social life

Source: Jens Boenisch (2016) Unterstützte Kommunikation,
in: M Dederich et al. (Hrsg): Handlexikon der
Behindertenpädagogik: Schlüsselbegriffe aus Theorie und
Praxis, Kohlhammer, Stuttgart.

4. Picture and Symbol Languages

4.3 Excursus – AAC

Body's own forms of communication:

Facial expressions
Eye movements
Showing movements
Gestures
Fingeralphabet
Individual signs
Speech
Sounds
Vocalizations

Non-electronic communication aids:

Panel/Board
Books
poster
boxes

Using materials, e.g.:
photos
symbols
drawings
Real objects
miniatures

Electronic communication aids:

Buttons
So-called talker
Writing based aids
Communication Apps

Input methods:
Eye control (vision-controlled communication aid)
encoding
Scanning method
Buttons
Special keyboards + key guards
Push button + sensors
Tracker (head mouse)

Info in German:

Was ist eigentlich UK?

<https://www.youtube.com/watch?v=xS4pgRFNgr4> (Dauer: 2 Min)



Symbole und Gebärden

<http://www.uk-ooe.at/>

LUK Lehrgang Unterstützte Kommunikation

<http://fbz.uni-koeln.de/luk/?lukid=0>

Forschungs- und Beratungszentrum für Unterstützte Kommunikation, Univ. zu Köln

<http://fbz.uni-koeln.de/>

How to get AAC devices?

Counseling services:

Person-oriented advice

Manufacturer independent advice

Workshops and training

Advice / support for grant applications

Rental options for testing devices in the familiar environment

Example: Lifetool (in German)

<https://www.lifetool.at/beraten/was-bieten-wir-an/>

Video LIFETOOL non-profit GmbH - not without my iPad!

https://www.youtube.com/watch?time_continue=448&v=MAAihicN3xU (Duration: 7 minutes)

Overview of the consulting activities of Lifetool

User reviews / user experiences: <https://www.lifetool.at/beraten/wer-kommt-zu-uns/>

4. Picture and Symbol Languages

4.4 Communication tables/panels

4.5 Semantic Compaction

5. Alternative Communication

5.1 Basics

5.2 Speeding up of communication

5.3 Text prediction

6. Visual Communication

6.1 History, basics and classification

6.2 Lip reading and Finger alphabet