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# Keynote presentations

## Tactile Reading

### The Importance of Political, Cultural and Pedagogical Perspectives in Providing Support for Readers of Braille and Tactile Graphics

### **Cay Holbrook**, Ph.D., Professor in the Faculty of Education at the University of British Columbia in Vancouver

This important conference is a gathering place for individuals who have a passion and commitment for tactile reading of text and graphics. Participants are varied in background, culture and the focus that they take on the topic. This keynote presentation will serve as a springboard for a wide range of discussions and collaborations during the next two days. The presenter will address the value of diversity and challenge the embrace and variety of political, cultural and pedagogical contexts that strengthen our understandings and provide rich ground for discourse that can move our work forward.

## Human centered design and the significance of user involvement

### **Yvonne Eriksson**, Professor holding the chair in Information Design at Mälardalen University

Human centered design (HCD) requires user involvement, but defining the user is a complex issue if one wants to avoid stereotypical categorizations. The lecture will discuss categorization of users, the conditions for tactile reading in relation to human centered design, and also how dominant design roots can hinder innovation. In order to challenge traditions and presuppositions, it is necessary to investigate present dominating conceptions regarding how tactile materials should be designed among those who commit the assignment, the designers of tactile material, and the users.

## The world beneath the fingertips and the cognitive processes that make it possible

### **Anneli Veispak**, Ph. D.

Learning to read is a complex task requiring the translation of written symbols, or graphemes, into speech forms, or phonemes. Despite the complexities of written language, the majority of children who are given appropriate instruction learn to read either print or braille with relative ease. However, there is a proportion of people who struggle in the process of acquisition. While print reading difficulties have extensively been studied, braille reading difficulties have, due to several reasons, received much less attention. In the current talk the results of our previous as well as most recent studies, answering some of the posed questions, will be discussed.

In our earlier studies, being inspired by the major theories explaining impairments in print reading, we investigated auditory, speech and phonological processing as well as tactile spatial acuity, to gain an understanding of how these perceptual and cognitive processes interact in support of reading braille as opposed to reading print. In our most recent study, the online lexical interpretation in braille reading was investigated.

## Touching for knowing

### **Edouard Gentaz**, Professor at the University of Geneva

The haptic perceptual system integrates cutaneous, proprioceptive and motor information related to exploration movements. We’ll show that this system plays a critical role in cognitive development and the development of the knowledge of their environment in sighted and visually impaired children. It is also an effective perceptual system for the comprehension of the tactile interfaces offered today to this specific public in museums, schools and libraries. We’ll examine a selection of studies about on manual exploratory processes and the comprehension of haptic devices in 2D, and recent studies about new haptic illustrations for visually impaired children. We’ll discuss the change in the way of designing illustrations for tactile books.

# Session 1

## 1:1 Sensorimotor control and braille reading

### **Dr Barry Hughes**, Lecturer in Psychology at the University of Auckland

Braille reading, like print reading, is a complex skill, engaging simultaneous perceptual, linguistic, cognitive and motor processing. Relative to print reading, the sensorimotor aspects of braille reading are unique to touch: although the same material may be comprehended to the same degree, how this is accomplished is quite different in braille reading. I describe these differences in order to highlight important modelling issues that they raise. In doing so, I put braille reading in a larger context --as a special case of tactile texture perception controlled by active touch-- that may be relevant also to research in tactile graphics. I elaborate on this with data we have collected from braille readers at opposite ends of the skill spectrum: fluent readers and complete novices. Research with fluent readers reveals kinematic features of how the fingers move when reading text of varying complexity and addresses questions of what finger movements reveal about how the mind reads braille. Readers who are encountering braille for the first time may lack knowledge of the code, but they come with a working procedural knowledge of how to explore textures: how fast to move and with what pressure, which fingerpad(s) to use, and whether and when to change scanning direction. I highlight theoretically significant aspects of these differences and suggest how and why they are relevant to both researchers and teachers.

Participants will learn:

* How experimental research on braille reading may be useful in promoting braille literacy;
* How research into the sensorimotor aspects of braille reading is related to theories and models of haptic texture perception;
* What kinematic and psychophysical approaches reveal about early and late phases of braille reading skill acquisition;
* What some important open questions regarding the sensorimotor basis of braille reading are.

# Session 2

## 2:1 Buckets, boxes & baskets!

### Promoting a holistic approach to pre-braille

### **Gwyneth McCormack**, Director at Positive Eye Ltd

Using a holistic theme-based approach during the emerging stages of literacy development is an important strategy for children with visual impairment and offers a multitude of rich literacy learning opportunities. Practical resources will be used to demonstrate how to incorporate pre-braille skills within the child’s emerging stages of literacy development. The reading readiness pathway of auditory and language development, tactile discrimination, fine motor skills, concept development and book and story skills will provide the framework for this presentation. Inspiration will be offered with practical strategies, ideas and suggestions using some popular children’s stories or themes to example the approach e.g. “Frozen” “A journey to the shop – including a visit to the Post Office”, “Going on holiday – including the ‘Lighthouse Keeper’s Lunch’” and finally “People as helpers including the Fire Service.”

Learning objectives:

* To understand the pre-braille pathway of emerging literacy skills
* To understand the type of activities required to develop pre-braille skills
* To understand how to incorporate and promote pre-braille skills and emerging literacy skills using a theme based, holistic approach

## 2:2 Ready for Pre-Braille? Let's Play With the Six Dots Cell!

### **Marc Angelier**, teacher of the visually impaired and **Marie Oddoux**, occupational therapist specialized in low vision from the French organization PEP-SRA

Our goal as a teacher of the visually impaired and an occuptional therapist working in a resource center for blind children, is to adapt the French national pre-school curriculum for blind students. We are developing an instructional method designed for children ages two through six that explains how to use a cell in several different ways to develop pre-braille skills. Designed to be used with children ages 2-6, the cell block method can accelerate pre-braille learning in pre-school and resulting adaptation of the French national preschool curriculum for blind students.

* Develop pre-braille skills by using different types of cells.
* Make and use your own tools.
* Use tools with sighted students, too; inclusion will be easier!
* Learn to help parents become part of the pre-braille teaching process.
* Start pre-braille at pre-school age for best results.

## 2:3 Case study: Teaching Braille to a 5 year old Estonian child

### **Sirli Lellep**, special educator-teacher at the Tartu Emajõe School

The aim of this qualitative study was to describe and supplement methodology to teach Estonian blind children necessary skills in written language and compose worksheets that could be used to teach Braille to blind children. Since it was a qualitative study the main ways for gathering the information were observation and reliance on practical methods. Different Braille teaching methodologies in foreign countries and in Estonia were analyzed and compared. On the ground of this information suggestions were made that can be used to teach necessary skills for written language for blind Estonian children. Linguistic context was taken into account. The study includes a comparison between sighted and blind children as well as practical suggestions on teaching a blind Estonian child (e.g. in what order to teach the Braille letters, what method to use for teaching reading and writing to a blind child). The study was conducted in hope of helping young teachers in Estonia who haven’t previously taught blind children. The study might also be helpful for those teachers in pre-schools and in mainstream schools that have no previous connection with visually impaired or blind children but who have a blind child in their classroom.

The bullet points of the presentation are:

* describing the process of teaching Braille to a 5 year old Estonian child
* showing and introducing videoclips (filmed by the author) about teaching Braille
* discussing childs progress from September 2014 to May 2016
* giving an insight to a young Estonian teacher’s (the speaker) mindset on teaching a blind children – the highs and lows of a first experience

## 2:4 The Braille bag

### Inspiration and support to families

### **Gun Olsson**, Special Education Teacher, Swedish Agency for Accessible Media

When a child is born with severe visual impairment the family is in need of support. It is, for most of them, a totally new situation. They have to find out how to make the daily life work, find other ways to stimulate their child than the common. It is for real a challenge. And when it comes to future reading and writing the family must get to know Braille. As for sighted peers, it is important for blind children to get reading experiences early in life. It is important for the development of language and to achieve skills necessary for literacy. Sighted children meet letters, words and writing everywhere in their surroundings. The situation is not that beneficial for children who will use Braille.

The Swedish Agency for Accessible Media, MTM, are financed by governmental funding to support people with reading disabilities with accessible literature, such as talking books and books in Braille. We also produce tactile picture books with Braille for blind children. To give these children the opportunity to become acquainted with books and tactile pictures in early age we offer the mini Braille Bag and the Braille Bag. Our hope is that the families gets to know about our services and of course that the material will inspire them to pre-Braille activities. The material is distributed in cooperation with the Low Vision Centers in all of Sweden. The mini Braille Bag includes a tactile picture book with nonfigurative pictures. It is suitable for really young children, as a sighted child gets its first cardboard picture book. The Braille Bag also includes a tactile picture book, with quite simple pictures, and also a kit for inspiration and new ideas for parents how to encourage children to develop tactile skills. The presentation will include an overview of the material and some thoughts about it.

* Thoughts about early literacy
* Ideas for a pre-Braille-kit
* Swedish Tactile Picture books

# Session 3

## 3:1 Linking mobility and mathematics

### Learning about location through concepts in mobility and mathematics

### **Ole Erik Jevne**, Senior Adviser and **Oliv Klingenberg**, PhD, Senior Adviser at Statped midt

Spatial concepts are integrated in our language, as they are vital in both mobility-route training and in mathematical thinking. This presentation is about an educational experiment conducted as a course in mobility and mathematics for pupils who read braille in the sixth and seventh grades. This is a course held by Statped, - the state agency in Norway that offers special education services within the educational sector. We have designed activities with the goal of helping the pupils to enhance their understanding of space: The surrounding space and the two-dimensional space, - from a mobility-route to tactile representation of the route. Our hypotheses are that when a pupil describes a mobility-route to another pupil, and they both have a tactile representation of the actual route, this activity provides a basis to understand coordinate geometry. We suppose that helping pupils refine the ways they speak about direction, distance, and location, enhances spatial understandings. Location activities, as how objects are located with respect to other objects, involve analysis of paths from point to point as on a map and the use of coordinate systems.

Questions:

* How do the pupils describe the connections between spatial concepts used in physical orientation and in a tactile illustration of the same mobility route?
* How do the pupils discuss the question: What makes spatial concepts in mobility and mathematics alike and different?
* How do the pupils specify locations and describe spatial relationships using coordinate geometry or other representational systems?

## 3:2 A BrailleStudio Experience

### **Eric de Quartel** and **Thessa Stevenson-Doosje**, teacher at Bartimeus Education

Braille increases opportunities for people with a visual impairment to gain access to information. When reading a book, learning how to write or working with complicated information, Braille is the best medium. What is BrailleStudio? BrailleStudio is a unique piece of software, developed to enable people to learn Braille in an interactive and intuitive way. BrailleStudio utilises text to speech technology and a Braille Display, allowing users to read and write Braille independently. BrailleStudio is inclusive in its design. It can be used by young children developing tactile discrimination skills, children in the early stages of learning how to read and write Braille and older learners who may have already acquired literacy skills.

BrailleStudio has been developed by a team of experienced professionals at Bartiméus alongside children and young people with visual impairments. Learning Braille through BrailleStudio gives learners several important advantages over more traditional methods. The activities can be differentiated to meet the needs of the learner. It uses a multisensory approach with a tactile, visual and auditory environment. Children can work together with other children – sighted or visually impaired and hear auditory rewards to motivate success. A parent or non-Braille reader can also participate in the process of learning Braille through the provision of onscreen text. Updates and new activities to BrailleStudio are available online and can be easily downloaded.

## 3:3 Math for beginners

### Making math fun for young children

### **Benjamín Júlíusson**, product manager and **Helga Björg Ragnarsdóttir**, product specialist at the National institution for the blind, visually impaired and deafblind in Iceland

For the last two years we have been adapting a math book that is used by first graders in Iceland so that it can be used by blind students that are taking their first steps in school. Before we made the book blind students mostly used braille in math without pictures and it was in the hands of each teacher to find a way to teach the subject. This changed with the new book. Now all the first graders are learning math using the same book, using the same teaching material and not just using braille but a different approach to solve the math problems. The main objective of the book was that students could be doing the same exercises at the same time as other students, that students could work independently and that math was fun with more diverse exercises than before. In the book we used many different ways to approach the subject, using braille, tactile pictures, small things, shapes, ritmuff and cards. In our lecture we will show the book, talk about the work process and the ideology behind the project and show a short video of a student using the book.

What participants will learn from this presentation:

* That it is possible to make math for blind students the same way as for the other students
* That with tactile pictures and by using diverse setup and teaching material it is possible to make math more interesting
* That blind 1st graders can work independently with their math book
* That you do not need a large group of people to make a project like this happen
* That math is fun

## 3:4 Making Mathematics Accessible

### A study of how paraeducators work with adaptations

### **Ulrika Vanhoenacker**, special education teacher, National Agency for Special Needs Education and Schools, Sweden

In Sweden all braille reading students are included in elementary school and they attend regular classes with a class teacher and a paraeducator. The paraeducator often has some kind of teacher education. The aim of the study was to highlight how paraeducators work with adaptations in mathematics for 7-9 year old braille reading students in primary school. It was a qualitative study and data were collected through video observations and stimulated recall interviews. This is a method where the interviews are based on sequences from the video recorded material. Three paraeducators were observed and interviewed.

All three paraeducators showed tactile material or whispered to the student at the same time as the class teacher explained mathematics for all students, including the student with blindness. The paraeducators’ explanations to this phenomenon were poorly planned lessons, the lack of time and the fact that the student wanted to know what the classmates were working with. Some of these simultaneous activities would easily have been avoided if the class teacher had verbalized her teaching, named the objects, rather than using expressions like "this" or “that”. All three respondents stated good planning as a prerequisite for being able to adapt the teaching, both planning of the actual lesson and planning of production of tactile material. As the students with blindness did not have time to finish all tasks, a priority of the mathematical tasks needed to be done in advance on the basis of the student's knowledge.

* Class teacher and paraeducator need to plan the teaching in advance, together.
* Class teachers need to verbalize the mathematical teaching.
* Paraeducators should not introduce tactile materials during class teacher’s instructions.

# Session 4

## 4:1 Exploring Museums

### Reaching Beyond the Glass

### **Ann Cunningham**, owner Sensational Books, art teacher at the Colorado Center for the Blind and tactile artist

How can we make a trip to the museum more interactive and informative? All too often students who are blind or visually impaired are limited to having the information on the labels read to them while the other students stand in awe of the objects on display. We have developed a number of ways for the students to engage more effectively with displays in a museum.

Techniques to reach beyond the glass

* + - How to make raised line images of the objects as you experience them.
		- How to use an iPad to make information more accessible.
		- How to interact within the space to explore the objects on display.
		- Don’t forget the gift shop!

## 4:2 Feeling Van Gogh: making Vincent van Gogh’s art accessible

### **Ann Blokland**, Curator of Education Van Gogh Museum

In 2015 the Van Gogh Museum launched *Feeling* *Van Gogh,* a special programme for blind and partially sighted visitors and their sighted friends, family and companions. It consists of an interactive guided tour and a multi-sensory workshop, using different interpretive media to open up the artist’s world, which before was not accessible to them.

Relievos – premium quality 3D reproductions of Van Gogh’s paintings – are the main focus of this workshop. The Relievos were developed by the museum and Fuji film at an earlier stage, but proved to be very suitable for this programme. Vincent van Gogh is known for his thick, impasto brush technique and the Relievos offer the opportunity to experience his paintings through touch and understand the way he applied the paint.

To amplify we also use simplified relief prints and a model of *The Bedroom*. Furthermore, the senses are stimulated by the scent of lavender from the south of France and quotes from Van Gogh’s letters. Since the launch we have learned, improved our material (eg. adding image descriptions to the tactile images) and developed a permanent display.

One of the main objectives of the Van Gogh Museum is making Vincent van Gogh’s life and art accessible to as many people as possible. *Feeling Van Gogh* is an important step forward in achieving this. Connecting with the artworks by appealing to touch and various other senses, and discussing Van Gogh’s art together, results in a very positive effect on how visually impaired people (being it adult visitors, children or youngsters) experience art. And we should start a young age, planting seeds for the future. Teaching and discovering art is as important as math or grammar; it inspires and enriches – and might even change your life.

There is a webpage on the Feeling van Gogh programme including a video: <http://www.vangoghmuseum.nl/en/whats-on/feeling-van-gogh>

Learning outcomes for participants:

* how we set up the programme (working and testing *with* blind and partially sighted people, including a special event with teenagers)
* how we use various materials
* what art needs to be interpreted and discovered successfully for this audience
* what we have learned from this programme and how we will take it forward

Other contributors:

* Dedicon contributed to the workshop by creating simplified tactile reproductions of some of Van Gogh’s most famous paintings.
* Bartimeus (Esther Rieken) gave valuable insights on the theoretical side of learning through tactile images.

## 4:3 KÄNNBART – an art project

### Art, exchange, competence – the key to success

### **Torbjörn Svensson** and **Sarah Remgren**, project managers of the project Kännbart

Until now people with deafblindness and visual impairments have not been much visible in the public room - especially not in the Swedish art-scene. However, in project Kännbart a completely new approach to include and collaborate with this target group was initiated. With contemporary artist new unique art piece was made with in a spectra of senses normally not in focus at the art scene. The work was building on courage, inspiration, and method development – current norms have been challenged. Together we will strengthen culture and diversity.

Bullet points, participants will learn:

* how people can meet through art when vision or hearing is not needed
* to have the courage to think outside the box and develop new methods
* how to use the capacity within the target group. People with deafblindness are experts in their own disability, and know best how to speak for themselves
* by meeting two people with deafblindness – participants will learn that fear comes by ignorance
* that it is not tricky to meet a person who doesn't see or hear – and will be inspired to initiate future collaborations not thought of before.

## 4:4 The relationship between tactile, kinaesthetic and sound experiences in visual arts

### **Kristina Elisabeth Steinbock**, MA/MFA Theory and Communication, Royal Academy of Fine Art in Copenhagen and teacher at IBOS; The Institute for the Blind and Partially Sighted in Copenhagen

In my presentation I will primarily speak about my work with young visually impaired pupils from IBOS in Copenhagen and how the implementation of art, poetry and sound opens up for new reflections on their identities and self-perception. By exploring haptic visuality as a term of touching with cinematic images and sound, I will also speak about my research on blindness through my own visual practise.

I am interested in translations *from* the tactile world *to* the audio-visual and reverse as a language between seeing and non-seeing through the body.

By exploring haptic visuality as a term of touching with cinematic images, I will present a more *touchable* approach or tactile’ way of perceiving visual art works in my research on blindness and thereby promote the development of studies in these fields.

My main focus teaching visually impaired residents or students at IBOS institute, is to mix reflections of their life with notions of body, senses, tactile experiences and mind. By introducing contemporary art to the students through audio, ether as descriptions or translations of visual and performance based artwork, I teach them about the freedom of thoughts that can happen within the art space and most important that they have a voice and that people can learn from their experience of the world.

# Session 5

## 5:1 Introduction to braille

### Supporting pupils in primary schools in Norway

### **Astrid Kristin Vik**, Senior Adviser / Ph.D. and **Jorun Hauge**, Senior Adviser at Statped

In Norway pupils who are intended to be braille readers enter their local schools, and have their education within the inclusive school system. The local school is responsible for the pupil's education

i.e. instruction to braille. The school needs to build competence in braille as well as in how to teach a pupil who is blind.

The local government receives services and support from the Norwegian support system for pupils with special educational needs - Statped. The services are courses for teachers, pupils and parents, guidance, production of materials in braille, and evaluation of a child's visual functioning. The pupils have legal rights to extra lessons for instruction in braille. These lessons are in addition to the core curriculum.

This presentation will focus on experiences from how pupils are introduced to braille and supported in their literacy development.

In 2014 a new material for introduction to braille for young readers was developed. The material is designed for pupils who learn braille in inclusive school. Experiences from use of this material and best practice from the classroom will be presented. The presentation will also focus on the pupils' legal rights to extra lessons for instruction in braille, the possibilities and challenges related to instruction in an inclusive context.

The participants will get knowledge about:

* How braille readers are supported in their literacy skills.
* Best practice and experiences from use of a new material for introduction to braille.
* Possibilities and challenges related to extra lessons for instruction in braille.

## 5:2 Tactile Textbooks that fit students with visual impairments using mainstream books

### **Leonoor Soet**, Educational Editor and **Mieke Urff**, Educationalist Special and Inclusive Ed., Dedicon Educational

Our presentation will offer an insight into the situation within the Dutch educational system which allows schools to choose methods/course materials which are suitable for their preferred pedagogy.. For one discipline there is a choice between 7 to 12 methods. Dedicon is a national non-profit organization in the Netherlands which provides access to information for persons with a visual or other print impairment. Dedicon Educational is faced with the challenge to adapt a vast range of requested course materials allowing these students to be included in mainstream education.

Achieving this for blind children is challenging for us, especially when they are not yet experienced braille readers. The textbooks that have to be adapted, are very colourful and full of images, crosswords, puzzles, etcetera. The publishing companies try to surpass each other in making their materials appealing for -sighted- children. Pupils are expected to draw lines, colour, underline and encircle, sometimes using markers in various colours.

In making the material accessible and usable for blind children working with a braille display or printed braille, we adjust the content, without discarding the original didactical aim of the authors. We skip, add, or rearrange text where necessary and we add tactile graphics in order to allow the children to work at the same pace as their (sighted) classmates. We want them to be able to work independently if needed, but also to team up with their sighted peers and participate in group discussions about today’s lesson.

What will participants learn from our presentation:

* Understanding the position of students with a visual impairment within the Dutch educational system.
* Understanding the choices we make adapting educational materials, that are designed for sighted pupils, for blind children, while staying as close as possible to the original.

## 5:3 Braille Butterflies

### The Four Stages of Metamorphosis to Braille Proficiency

### **Ms. Skye Jones** (Nationally Accredited Highly Accomplished Teacher) and **Mrs. Sharon Rattray** (Deputy Principal), South Australian School for Vision Impaired (SASVI)

The philosophy behind teaching Braille at South Australian School for Vision Impaired has evolved to bring together students who are blind and those with limited functional vision, together in groups of similar developmental stages. Learning Braille occurs in the classroom environment with a qualified teacher of vision impairment. Learning is structured to include a broad and balanced approach to pre-braille and beginner braille reading activities in the following five areas; tactile exploration, fine motor skills, mathematical concepts, spatial awareness and group work. As students progress with these skills, the focus of the program moves towards the intricacies of the UEB Literary Braille Code; identifying letters, contractions and wordsigns, punctuation and rules associated with the code. Simultaneously, students experiment and engage with Braille technologies.

Participants will learn about:

* Braille Butterflies program outline
* Variety of daily lesson plans and associated resources
* Videos of students at work
* Assessment tools to demonstrate student progress and evidence of success to support this program
* Whole school literacy approaches which support the learning of tactile and print readers simultaneously

# Session 6

## 6:1 Concept development of Blind Children

### A General Introduction

### **Ans Withagen**, Dr., Royal Dutch Visio

On the basis of what our senses tell us we build ‘concepts’. These help us understand the world. Conceptualization, as this process is called, does not take place in quite the same way in blind children as in sighted children. This is because their perception of many objects and other things in the extrapersonal and peripersonal space (or far and near space) is different.

During the day our senses provide us with all kinds of information. This is how we make sense of the world around us. Each sense has its role to play and together they form ‘a bridge to the world’.

A huge difference between the sense of touch and vision is the fact, that ‘touch’ is a so-called near sense and ‘sight’ is a far sense. For many of us, sight is the dominant sense and therefore the most important. It allows us to take in a situation at a glance and that is why we rely a lot on this sense. Blind children lack this ‘overview’ provided by the sense of sight and have to compensate by using other senses.

During the presentation extra information will be given about the sense of touch; the different functions and characteristics of touch will be described. Furthermore, the influences will be discussed that affect the concept development of children with a severe visual impairment. Advices will be given to guide these children during the concept development.

* The far and near senses will be clarified
* The difference between cutaneous and proprioceptive touch will be explained
* Several characteristics of ‘touch’ will be presented
* Different factors which influence the concept development will be described
* ‘Good practice’ to stimulate the concept development will be discussed
* The book “In touch, helping your blind child discover the world” will be introduced

## 6:2 Development and Evaluation of *Haptic-Books*

### Exploring Body Movements for Visually Impaired and Sighted Children

### **Dannyelle VALENTE**, Post-doctoral researcher & **Edouard GENTAZ**, Professor, Laboratory of sensorimotor, emotional and social development, University of Geneva

The haptic perceptual system integrates cutaneous, proprioceptive and motor information related to exploration movements. This system plays a critical role in the development of the knowledge of their environment in visually impaired and sighted children. In this talk, we present the first results of a research project (FNS project - Swiss National Science Foundation) focuses on the development and study of *Haptic-Books*. These books suggest a new exploratory process in the discovery of the illustrations. Using two fingers, the reader mimics the movement of the legs and engages in a journey that starts from the first page of the book. The two fingers perform various actions: jump on a trampoline, climb and descend stairs, play on a swing, etc. Our hypothesis is that this exploratory process relating to sensorimotor experiences is possibly common to sighted and blind children. In order to select pertinent actions that will be used in the book prototype, we asked to a group of 20 blindfolded sighted and a group of 10 congenital blind adults to simulate with their fingers 20 body actions (i.e. to walk, to run, to jump, to pedal, to skate, etc.). A total of 600 fingers movements were recorded and judged by sighted persons choosing a verbal label from a list. The percentage of the agreement judgement allows to define the more suitable actions to generate prototypical fingers movement in blind and sighted individuals. 3D illustrations (using pop-up mechanisms) engaging this fingers movements will then be developed by *Les Doigts Qui Rêvent* - partner in this project - and tested with a new group of participants.

What participants will learn from the presentation:

* Knowledge in the field of haptic perception and embodied cognition.
* New evidence about the existence of prototypical fingers movements and the differences and similarities between blind and sighted.
* New methods and design models of multisensory illustrations in tactile books.
* Original approach allowing users to enjoy a shared experience of the book by highlighting experiences that are common to sighted and blind children (Design for all approach).

## 6:3 The Language of Lines: The Design and Use of Tactile Graphics

### **BJ Epstein**, M Arch. at the LightHouse for the Blind and Visually Impaired

In addition to braille and computer literacy, students need a firm foundation in tactile literacy. There is a great need for a general tactile literacy curriculum with supporting tactile graphics training materials. We will cover what works and what does not with tactile graphics, and briefly talk about how to read, comprehend, and create graphical information using the language of lines. We will show good and bad examples, and introduce participants to resources where they can learn more.

# Session 7

## 7:1 Digital material and 3D-prints in education – separate or combined?

### Guidelines and ideas for educational material

### **Kirsten Rassmus-Gröhn** and **Charlotte Magnusson**, associate professor at Lund UniversityAlthough there are a lot of opportunities, and you start to see more and more applications of how to use 3D printers in society, it is as yet uncommon that they are systematically used for creating tactile materials for pupils in school. The reason for using 3D print technology are several. It is cheaper to manufacture products in one copy or in very small series with the help of 3D printers, compared to using other manufacturing methods for plastic. It is also a great tool for short iterations to test ideas and prototypes. That way you can create a model, print out a copy, test it, make a small changes in the model and print the next.

3D printing technology has previously been used to make more detailed maps, create tactile picture books, give access to 3D scanned historical objects and renderings of Hubble telescope images of outer space. It is also possible to scan a person and print a small model. There are companies that do this in much the same way as one goes to a photographer. Even ultrasonic scans of the fetus have been printed, for example to parents who are blind.

During 2015 we have conducted an investigation about the use of 3D prints as curricular material in schools. The goal has been to collect knowledge about 3D technology per se, to generate recommendations and guidelines, and to find out if there would be a way to support the creation of 3D models for pupils with severe visual impairments. According to the investigation, 3D models could be used in schools on different levels – from the automated level where 3D models are created and distributed from a central agency, down to the opportunities that open up to teachers and students making their own material by 3D modeling. The 3D models and their use by pupils with visual impairment could also be enhanced by combining the physical 3D prints with digital information in the form of NFC tags.

Participants will learn:

* Practical issues about 3D modeling and printing
* Guidelines for creating models for education
* How to start if they want to create their own 3D models
* How NFC tags can enhance the 3D models with meta and/or detail information

## 7:2 Jumping off the page: 3D printing for tactile representation of graphics

### **Leona Holloway**, Research Assistant, Monash University

3D printing offers a new but relatively unexplored medium for presenting graphics to people who are blind or vision impaired. Extensive user feedback on 3D printed objects was gathered from blind and vision impaired school students, University students and adults in a series of exploratory studies at Monash University. These studies included:

* The creation of a wide variety of 3D models and corresponding tactile graphics of maps, buildings, charts and other learning objects;
* Trial and development of technologies for the addition of descriptive audio labels on 3D printed objects;
* Working with a school for vision impaired children to identify suitable uses for 3D printing within the curriculum.

Here we provide a summary of what innovations worked, what didn’t, and when 3D prints are preferable to standard tactile graphics. A number of outcomes will be presented, including:

* The advantages and disadvantages of 3D printing, based on user perspectives;
* Suggested objects and topics for 3D printing, with hand-on samples;
* Options for associating label text with 3D objects.

## 7:3 Tactile science education (TSE) for visually impaired children

### The life cycle of the brimstone butterfly

### **Janja Plazar**, Ph.D, assistant professor, University of Primorska

Authors: Janja Plazar, Ana Murn and Aksinja Kermauner

Implementing science education in early childhood takes advantage of a child’s disposition to learn about natural phenomena and is of great importance to a child’s development, supporting inquiry skills and development of scientific concepts. Contemporary instructional approaches for science education draw heavily on the constructivist philosophy, in which children act as active participants in the learning process and thus on basis of their own experience construct new knowledge. However, in the past science education for visually impaired children remained often inaccessible and neglected, as also traditional science teaching was based predominantly on visualisation of both instructions and concepts.

Visually impaired children perceive the world predominantly through the other non-visual senses, implicating that enhancing their knowledge, requires adjusting the scientific experiments and modification of the educational tools, emphasizing the sense of touch.

In our study, life cycle of the brimstone butterfly and its habitat was presented in two forms: of a physical model and a tactile picture book. The model contained removable elements of the individual stages of the butterfly’s life development cycle. The tactile picture book contained the consecutive stages of the butterfly’s life cycle through tactile images, and it included practical exercises about its habitat. As the modified educational tools were intended for both visually impaired students and for fully-sighted children, the potential learning capacities of both forms were tested in two groups of elementary school children: in a group of fully-sighted and in a group of visually impaired children. In both groups, knowledge about butterflies was tested before and after introducing the modified educational tools through interviews that were qualitatively assessed. For both children groups, significant increases in both the knowledge and the perception of the addressed topics were found.

Our results show that all children, both fully-sighted and visually impaired, could benefit from a new generation of modified and adapted science education tools. Besides, such novel tools impose that new scientific knowledge is acquired in an active inquiry-based way, while at the same time minimizing misconceptions, and providing high-quality science education for the future.

What participants can learn from our presentation?

* Tactile science education tools are beneficial for all children.
* Combination of tactile physical model and picture book induces synergistic learning.
* Modern tactile science education is of high-quality without scientific misconceptions.

# Session 8

## 8:1 Discrimination Strategies – How specialised are they?

### **Torø Graven**, Dr at the University of Oxford

Previous research on how tactile 2D information is discriminated, has traditionally focused on either braille characters or shape features: It has investigated (1) whether braille characters are coded as outline shapes or dot patterns1-3, or (2) what shape feature geometry is recognised the most proficiently, e.g. acute or obtuse angle4-9.

In contrast, Graven10-11 recently focused on both: She investigated how individuals who are blind described discriminating (1) braille characters, e.g. L from Ns and R from Vs, and (2) shape features, e.g. angle from straight lines and angle from curves, including ranking target-discriminating features in importance – their discrimination strategy. Indeed, Treisman and Paterson12 have suggested that individuals, who use vision to detect 2D targets amid distractors, may adopt different, even personal strategies. Graven10-11 identified three discrimination strategies for braille characters and three for shape features, including their phases of attention.

The participants will learn about:

* Strategies for discriminating (1) braille characters, and (2) shape features.
* The ranking of target-discriminating feature(s) in importance.
* Attention.
* Discrimination proficiency.
* Similarities and differences: How specialised are the discrimination strategies?

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# Session 9

## 9:1 Developing decoding skills and fluency in braille reading

### **Anders Rönnbäck**, advisor and **Kia Johansson**, advisorSwedish National Agency of Special Needs Education and Schools

The principle of decoding is based on the association between a sound and an alphabetical character. For the sighted child the shapes of letters are learned long before school starts in both spontaneous and structured reading and writing activities. The consequence of this is an over-learning of character shapes with favourable outcomes for the development of reading. The child with blindness however meets tactile characters to a very limited extent and needs to be compensated for the lack of corresponding stimulation.

A couple of years ago a Swedish study was performed with the purpose to examine the possibility to strengthen tactile decoding by using a certain training program. The training program used was originally developed for sighted students with reading and writing difficulties. Basic ideas are focus on decoding, a simple structure and clear documentation of the student's reading development. Characteristics of the training program are high intensity and a touch of competition during reading sessions. Each single session consists of six elements; two versions of single letters, two-letter-combinations and single words. Each student should leave the session with a feeling of having succeeded.

In this study a single-subject design was used with each participant serving as his or her own control. Nine braille reading students in 3rd grade a certain year participated in the study. The local teachers were in charge of training sessions and documentation. The intervention went on for a period of 14 weeks and a standardized word recognition test (WRT) for sight reading was used to monitor the students’ reading development. Students’ opinions about reading and teachers’ perceptions of the intervention were reported.

Results showed that reading speed and accuracy improved to an extent that is likely to exceed the expected development of a child’s reading performance. But even more interesting was the teachers’ opinions of changes in their students’ reading behaviour and attitude.

This presentation highlights the following

* Specific demands in developing functional, tactile reading skills
* A need to compensate the lack of over-learning in the tactile reader
* A specific method to strengthen the tactile decoding

## 9:2 Braille reading technique

### How to increase the speed of Braille reading

### **Gyntha Goertz**, Braille specialist, Royal Dutch Visio

As a teacher we all know that correct reading and reading speed is important, also in braille reading. In practice, teachers mainly focus on correct reading. The biggest challenge in teaching Braille however is not only to teach reading but mainly to guide the child to the most optimal technique for fluent reading. Young children can not immediately apply the correct read technique but should learn it step by step. When the child notes progress, it will enjoy reading by touch. In this practical presentation the focus will be on special skills to teach young Braille pupils to improve their reading speed.

In the Netherlands we had a practical research in primary schools about this theme.We developed an observation list “good skills in reading braille” for charting the braille reading of each braille reader with the aim of increasing the speed (the list is also useable for teaching late-blind students). Susanne Millar’s books ‘Reading by touch’ and ‘Space and Sense’ has been used as a source of inspiration on the items “reading technique” in this observation list. The list is primarily intended for reading Braille on paper and turned out useful as directive for teachers as well as for pupils themselves. Starting points of guiding Braille readers turn out to be:

* Awareness of the optimal reading technique
* Observing and analyzing data
* Interaction between teacher and child/student
* Establish goals per pupil depending on the age and possibilities

During the presentation ‘good practice’ will be shown such as exercises for the automatism of Braille characters and ways to stimulate the correct sitting posture. Advices will be given to encourage and guide the pupils in reading with as many fingers on the line as well as the two handed reading technique.

* The observation list will be presented and distributed.
* Participants will have a tangible experience how to perform the optimal reading movement itself.
* Short films of infants will be shown, for participants to see some examples of the development of the optimal two handed reading technique.

## 9:3 Reading speed and comprehension in braille

### **Luis González-García**, Ph.D. Psychologist at the National Organisation of the Spanish Blind

This presentation shows the results of a comparative study on the performance in reading speed and comprehension by a group of 122 blind people (braille readers) and a group of 133 sighted people (ink readers), which academic levels were from 5th degree to University, in relation to different personal factors (academic level, blindness onset, experience in braille reading, braille reading pattern). The results show that, although the reading speed of the blind group is two-three times slower than that of the sighted people, both groups show similar levels of reading comprehension in braille and ink, respectively. The developmental pattern in reading comprehension of the blind group is different from that of the sighted group in relation to the academic level: although the blind children show a relative delay in reading comprehension at the first levels when compared to sighted children, at later levels the delay disappears. Of the rest of controlled factors, some of them has influence in reading speed, but not in reading comprehension.

Bullet points explaining what participants will learn from my presentation:

* My presentation is connected with the topic “Braille and literacy”, specifically with the subtopic “Development of tactile text reading/braille reading”.
* The sample size is very representative, and consist of a group of blind people (122 individuals) and a group of sighted people (123 individuals), which academic were from 5th degree to University. A much larger sample that most of the research on blindness!
* We controlled several important personal factors (academic level, blindness onset, experience in braille reading, braille reading pattern, previous experience reading ink,…).
* Results shows the importance and full validity of braille system.

## 9:4 iBraille Challenge App

### Technology & Fun for StudentsWho Use Braille

### **Frances Mary D'Andrea**, Ph.D., Educational Consultant and member of the IBraille Challenge team

This session will provide an overview of a new mobile app based on The Braille Challenge, a braille reading and writing contest sponsored by the Braille Institute for students in the U.S. and Canada. The app is being developed with funding by the U.S. Department of Education's Office of Special Education Projects to help teachers and parents assess and build braille reading and writing skills. The project director is Dr. Cheryl Kamei-Hannan at California State University, Los Angeles. The app is designed to be used with a refreshable braille display working with an iPad. The Reading section of the app includes oral fluency passages that can be automatically recorded to provide teachers with the ability to perform a digital miscue analysis. Multiple choice contests assess reading comprehension; additional games help students practice braille fluency, vocabulary, and making inferences. The Writing Section of the app includes multiple-choice contests to test proofreading skills, and a dictation contest, where students must accurately braille an audio-provided word or phrase. Writing games have also been developed. Both contest sections will capture student performance and demographic data. Activity results provide teachers with reports that highlight student strengths and needs, and activies give students an opportunity to build both braille and technology skills. The app will be available for free in the iTunes store in 2017.

Participant learning objectives:

* Attendees will be able to describe how this tool can help identify students’ strengths and weaknesses in reading and writing as well as approximate grade level.
* Attendees will be able to describe how this tool can be used to do miscue analysis of their students’ oral reading skills.
* Attendees will be able to describe how to use the activities in this app to support basic braille literacy skills.

# Session 10

## 10:1 Tactile Books: From the Ground Up Including Two Paradoxes

### **Philippe CLAUDET**, Teacher, founder and director of *Les Doigts Qui Rêvent* (Dreaming Fingers) and founder and charirman of *Typhlo & Tactus*

We think we know what a tactile illustrated book (TiB) is, its value and what it can provide for a young child with visual impairment, but perspectives differ, basic terminology is sometimes inconsistent, and fundamental questions have not always been thoroughly examined. This presentation seeks to go back to fundamentals in order to offer new insights, examining what we thought we already knew, as well as what we do not yet know. It will do so from the perspective of a professional who has focused on the development of tactile books for more than 20 years. The presentation will answer to some questions as: What is a tactile picture or tactile illustration in a book? What is to a “read” a tactile picture? 🡪The Sherlock Holmes’s paradox. The producers of tactile pictures for the Blind are sighted. 🡪The Sock’s paradox. How to design a tactile book for a particular child? Who is/are the audience/s for tactile books? What are tactile books able to provide for these audiences? Why Perkins School for the Blind speaks about “famine book”? What is the economy of tactile illustrated books?

Research, from Révèsz to Gentaz & Heller via Eriksson and Valente, will be included. Examples of tactile pictures and books will be analyzed, critiqued, discussed, but authors will be encourage to continue to provide tactile illustrated books because it is one of the best tool to prepare reading.

Participants will learn:

* the great value of TiB in education and teaching
* the difference between tactile and haptic illustration
* the complexity of designing a TiB
* that blind children do not have eyes on their fingerprints
* what new technologies can provide to TiB

## 10:2 The Tactile Picture Book Project

### Opportunities for Design, Customization, and Access to Tactile Picture Books Through Digital Fabrication and Broadscale Community Engagement

### **Abigale Stangl**, PhD Student- ATLAS Institute, University of Colorado

Authors: Abigale Stangl, PhD Student- ATLAS Institute, University of Colorado, Boulder

Jeeeun Kim, PhD Student Department of Computer Science, University of Colorado, Boulder Dr. Tom Yeh, Assistant Professor in Computer Science, University of Colorado, Boulder

Many caregivers and stakeholders invested in supporting children with visual impairments have shown interest in using 3D printing to make accessible tactile materials. Unfortunately, the task of designing and producing 3D printable tactile pictures is far more complex than simply learning to use personal fabrication tools. At the University of Colorado Boulder we conduct design research to investigate the opportunities associated with using digital fabrication methods to make accessible tactile materials. We will present an overview of findings from a series of research and outreach endeavors, including:

1. The use of 3D printed pictures as design probes to learn about stakeholders teaching/learning needs (Stangl et al 2014);
2. Requirements for the meta-design of a collaborative tactile picture design application (Stangl 2015a);
3. Results from co-design activities to involve people with visual impairments in the design of tactile pictures;
4. Results from engaging engage secondary school youth in the universal design and 3D printed tactile materials for people with visual impairment (Stangl et al 2015b);
5. The design and development of a html-based, accessible 3D modeling program (www.craftml.io), and of a tool to support the creation of rapid 3D printable raised line drawings; and
6. Results from customizing tactile picture books on craftml.io based on the requests of people with visual impairments and their caregivers.

While attending our presentation, conference participants will gain:

* An understanding of the research being conducted at the University of Colorado and our goal of investigating how to increase the supply of accessible tactile materials through the use of digital fabrication tools and educational activities
* Engage in discussion about the trade-offs and use cases for using 3D printers to make tactile pictures

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## 10:3 Tactile illustrations improve interactive reading

### **Colette Pelt**, MA, developer at Pelt Tactile Reading and Picture Books Plus

Literary competences and literary education are major pillars in primary education. Colette combines her earlier experience in primary school education with her master Children’s Literature and research on tactile picture books for the blind. The result of this research proved there were no equivalent and challenging adapted tactile picture books available. The study also showed the children with sight loss used words and sayings without understanding the meaning. Body language, figurative language and visual language are difficult to understand.

To conquer this challenge Colette has developed a method. This method involves completely remade existing, popular picture books, with drawings in relief and the story in Braille and large print. In the set enclosed are the original picture book, a reading manual with information and instructions for teachers plus one or more objects for the children to feel. So children with sight loss can participate in interactive reading, stimulated by tactile illustrations. In this session Colette will show how this method enables inclusive education. So children with a visual impairment will be able to read the same picture books as their sighted peers.

## 10:4 Tactile Semiotic Code in tactile picture books

### **Aksinja Kermauner**, PhD, assistant professor, University of Primorska, Slovenia

Kress and van Leuven regard as multimodal the texts in which different semiotic codes appear: textual, pictorial, sound, movement ... The interpretation of texts usually takes place at the level of textual and pictorial codes, while the tactile semiotic code usually remains completely neglected; probably because tactile picture books (picture books with tactile illustrations) are generally understood to be and are conceptualised and designed as intended for blind users. Experience shows, however, they are also interesting for fully sensed children. Multimodal texts are closer to children, they address several of their senses, and so it is easier for them to remember the content.

In my research I primarily focused on the tactile semiotic code with tactile illustrations. I wondered whether parallels could be drawn between metafunction that appears at pictorial level and the metafunction at tactile level. Ideational metafunction represents the world of experience, which in the pictorial code is expressed with interactive participants and with their relations in the world. Interpersonal metafunction represents and expresses the relationship between the author of the sign and the addressee, which in pictorial code manifests with establishing interaction between the presented and the interactive participant (reader). Textual metafunction expresses the relation of a set of signs that in the environment mean a coherent whole. In pictorial code we speak about composition, where the choice of structures in the system of the composition forms its meaning.

I have analysed the decoding of a tactile message at all the three levels of metafunction with persons that were born blind, and those who lost their vision later. In the discussion I attempt to determine with the analysis to what extent the tactile code is different from textual or pictorial codes and what are its specificities. I have set myself research questions in the sense: with what elements of tactile image can the reader get into interaction, what attracts her or his attention, what is the order of touching the tactile image, how do the composition and different materials affect it, etc. Are the semiotic resources in perceiving the textual or pictorial semiotic code the same as in perceiving the tactile code?

What participants can learn from our presentation?

* The analysis of decoding a tactile message at the three metafunction levels of blind-born persons, and later-in-life visually impaired.
* The difference between the tactile code and the textual or pictorial codes.
* With which elements of the tactile image can the blind “toucher” interact?; what exactly attracts the person to this attention?; the order of touching the elements within the tactile image; how the blind “toucher” experiences the composition and the different materials, etc.

# Session 11

## 11:1 Tactile symbols and schedules

### Enhancing activity and observing the use of tactile schedules

### **Gro Aasen**, Senior Adviser and PhD at Statped

This presentation will focus on descriptions and evaluations of how tactile symbols and schedules are used among seven children and adolescents who are blind. A special focus will be on how the children read their tactile schedules. Tactile symbols and schedules are widely used for individuals with visual impairment and varying degrees of additional disabilities such as autism spectrum disorders (ASD), and intellectual disability. Schedules may give information of planned events throughout the day (i.e., a daily plan) or an activity or work-session (e.g., writing or reading tasks, gymnastics). Schedules are also considered a useful tool for communication and to enhance activity. Schedules that present tactile information, as opposed to merely auditory, may give individuals who are blind increased possibilities of access to information or other things relevant to the individual.

Two studies from a doctoral dissertation within the field of special needs education will be presented. The title of the dissertation is: *Language and activity among children and adolescents with congenital blindness. An observation-based study.* One focus within the thesis has been on the effect augmentative and alternative communication (AAC) – using tactile symbols and schedules – can have for children with blindness in a heterogeneous sample. The tactile symbols that were in use, covered a wide range of symbolic representation from “tactile iconicity” to arbitrary symbols such as braille.

The participants will get knowledge about:

* How the availability of tactile symbols and schedules seems to increase the level of activity and the participation in school among the pupils in the presented studies.
* How the pupils used several strategies when reading the tactile schedules, both reading strategies they had been taught and their own strategies.
* That the tactile schedules could cover functions such as increasing predictability, promoting a sense of agency and being used as an aid to promote communication.

## 11:2 Achieving inclusion among children with and without vision impairment - Reach & Match Fun for All

### **Mandy Lau**, Founder & Designer of Reach & Match® Learning Kit, Melbourne, Australia

Reach & Match® is an innovative and research-based education kit to empower children with vision impairment and complex needs to develop braille literacy and essential childhood skills through a well-designed inclusive learning program. The research of Reach & Match® has included trend of braille application, braille learning & tactile development for vision impaired children, essential emotional development and functional skills for children with multidisabilities. Inclusion is important, yet is hard to achieve, especially among children. To help vision impaired children develop an incentive to learn braille at their early age, they should have positive emotion and fun experience to braille literacy. Therefore, Reach & Match® is designed in a way which is also a beautiful combination of sensory elements and interactive features based on the understanding and concern of difficulties that children with disabilities facing in a mainstream environment. Most importantly, the concept of inclusive design raises the awareness of different forms of languages (print & braille) and teaches mutual respect and understanding among children.

Reach & Match® Inclusive Learning Program is a secondary development from collaborating with the early educators, therapists and parents to design the activities for early intervention. 30+ activities and games are designed based on 7 learning outcomes: Braille Learning, Cognitive Skills, Sensory Integration, Sense of Satisfaction, Language Enrichment, Body Movement and Social Interaction. Children and teachers are inspired to design their own games, with the best ideas selected and added into the Reach & Match® Inclusive Learning Program, hence a community within teachers, therapists and parents is created.

[www.reachandmatch.com](http://www.reachandmatch.com)

## 11:3 Inclusive literacy

### A new method for braille literacy

### **Elena Gastón**, teacher at the National organisation of the Spanish blind

After decades of experience in the field of education and support to students with visual impairments, the Spanish Braille Commission (CBE) of the National Organization of the Spanish Blind (ONCE) has taken an important step with the development of a new methodology and didactics of Braille to suit new approaches on neurodidactics, education, technology and society in general.

In the presentation, we will first explain the theoretical foundation of this new method, published by ONCE in 2015: “Teaching Braille beyond the code. New perspectives on literacy for students with visual impairments”. As it states, literacy is a process that goes beyond simply a code, and remains in the time beyond the school stage. As it is established in the Convention on the Rights of Persons with Disabilities (UN, 2006), students with blindness or severe visual impairment have the right to use Braille, but as they are included in schools and into society, we need to make more inclusive methods.

Currently, almost all students with visual disabilities from Spain are enrolled in mainstream schools where literacy methodologies and didactics are increasingly visually attractive and technologically interactive. This is a challenge when it comes to teach Braille in an enjoyable and motivating way.

This new method is an inclusive approach, appealing to both blind and sighted students, which promotes motivation and self-esteem, enhances their capabilities and minimizes errors, combines traditional learning with technology, promotes autonomy and cooperative learning, and encourages the expansion of interests and knowledge through reading and writing.

After the theoretical presentation, we will explain each of the four modules that comprise the method: pre-literacy skills; preBraille; formal Braille and effectiveness of reading and writing. All of them together meet the needs of children from birth until completion of primary education.

Finally, we will show the materials that compose the method, including three-dimensional materials, children's stories and worksheets in Braille and a computer program to play and learn Braille with a digitalizer tablet and a Braille display from the first moments of learning.

In this presentation the audience will learn:

* The understanding that learning Braille is not only learning a method, but a complete literacy process when you are a child.
* How technology can help teachers and students in Braille literacy at the same time that makes it more inclusive.
* The new Braille literacy method ONCE is developing, mixing traditional and technological materials.

## 11:4 Inclusive Tactile Design

### Designing with braille and tactile graphics

### **Ann M. Conefrey**, independent graphic designer

In 2014 I set up Braille Dots, a platform aimed at researching and initiating design projects to promote the use of braille and tactile graphics. Braille facilitates the development of essential literacy skills and as such should be considered as normal and important as printed text. Moreover, tactile graphics can be used to enrich and support written information in braille. As a designer, I am very critical about the somewhat clinical way in which braille and tactile graphics are ‘produced’ rather than being actively incorporated into a design process.

We live in a world of words, colors, lines, patterns and textures. By combining my knowledge and experience of visual disabilities and braille with my professional background as a graphic designer, I can translate this visually rich world into multi- sensory forms which are accessible, appealing and stimulating for all. In short, create designs which are educational, fun to use and which encourage tactile exploration, language skills and social interaction.

By researching, experimenting, and testing a wide range of graphic techniques and materials it is possible to develop new and exciting tactile graphics. For instance, screen printing, embossing and digital applications each have their own distinctive properties which require a different approach when designing; this in turn paves the way for a whole variety of tactile solutions.

Learning outcomes for participants:

* Demonstrate how multi-disciplinary collaborations and engagement with the visually disabled to test ideas can increase the quality of designs.
* Show examples of inclusive tactile designs in which braille, print and tactile graphics have been integrated.
* Talk about materials and techniques, such as embossing, screen printing, laser, 3D printing and digital applications and how they can lead to new and interesting tactile design solutions.
* Discuss accessibility and the advantages of appealing to a larger audience to fund more projects for children and adults with a visual disability.

# Session 12

## 12:1 Reading development for six students with blindness or severe visual impairment – a longitudinal case study

### **Kim de Verdier**, Lic. psychologist and PhD student, at SPSM and Stockholm University

This longitudinal study examined the school outcome for an entire age cohort of Swedish students with blindness or severe visual impairment (n=6) in inclusive educational settings. All six students had after assessment been recommended braille as their primary reading medium before school start. The aim was to describe the students’ experiences of pedagogical support, general school achievement and reading development during compulsory school (grades 1 – 9). The study had a mixed methods approach. Qualitative interviews with students, parents and teachers were performed in grades 1, 2, 3 and 9. In addition, school grades (grades 8 – 9) and results from reading observations (grades 1 – 7) and a reading test (grade 9) was collected. The results revealed great differences concerning the students’ experiences of the support offered in the schools, their levels of achievement and their reading development. All six students started as emerging braille readers, but their reading development then took different directions. Two blind students developed good braille reading skills, while two other blind students (with additional disabilities) had extensive problems with reading. Two partially sighted students both gave up braille-reading at different points. Several teachers stated that it was difficult to support the students in their reading, because they themselves didn’t have enough braille-competence. We know that reading skills are closely linked to general school achievement. Becoming a successful braille reader is a demanding process and a great responsibility lies on the environment to encourage the students to develop and maintain their braille skills.

* In Sweden most braille reading students attend inclusive educational settings, but the support they receive is not yet equal
* The heterogeneity of the population of children with blindness/severe visual impairments needs to be considered when planning and shaping the pedagogical support
* Motivation, attitudes and competence are key factors for the students’ reading development
* Swedish general education teachers need more competence in braille and teaching methods for students with visual impairments

## 12:2 In the borderland

### Why is it important for partially sighted children to learn Braille?

### **Ann Jönsson**, Project Manager at the Nordic Centre for Welfare and Social Issues

To be able to see a little bit, like I can, means that you are living in a kind of borderland. You are neither blind nor sighted. For many years it was very important for me to define myself as fully sighted. I did not walk with the white cane, and I did not use Braille, which I had learned as a child. When I finally understood that I needed both of my written languages I felt that I finally was coming home, like I was becoming a whole person. Blind and partially sighted children´s right to a written language is a vital issue for the Swedish Association of the Visually Impaired.

Points in my speech

* My experience of a life with two written languages.
* Using Braille in my professional life
* To be partially sighted – living in a borderland – and risk to be without a written language.
* The importance of inspiring partially sighted children to learn Braille.
* The technical development – future challenges

## 12:3 Writing System or Code?

### Potential disconnect between readers and teachers

### **Robert Englebretson**, Assoc. Professor of Linguistics, Rice University, USA

Much of the professional and pedagogical literature treats braille as a 'code', i.e. a rule-based transliteration system for print. Learning to read braille, then, entails converting between the two systems--learning to 'transcribe' print into braille, and, conversely, learning to 'backtranslate' braille into print. However, recent research has suggested that, for proficient adult readers at least, braille is better conceived of as a native 'writing system', with its own unique cognitive representations and linguistic structures, and that braille readers are not actively 'backtranslating' into print when they are reading. Therefore a disconnect likely exists between many teachers (most of whom are sighted readers who learn braille professionally as a 'code' through their experiences as print readers), and their students, on the other hand, who approach braille as their native 'writing system', and do not typically have prior experience as proficient print readers. We hypothesize that this disconnect may ultimately lead to choices in how braille is taught, which may affect the facility with which young readers learn it. If teachers treat braille as a 'code', then they will teach their students how to be 'print decoders'; whereas if they view braille as a 'writing system', then they will view their work as to ultimately enable their students to use braille to become readers and writers. Our talk gives an overview of the code-based metaphors for braille used in the pedagogical literature, the recent research in cognitive science dealing with braille as a writing system, and outlines the consequences of these views for teachers and braille learners. We conclude by suggesting future research areas (both academic and pedagogical) to address this disconnect and facilitate greater braille literacy.

Bullet points:

* What is the difference between a 'code' and a 'writing system'?
* What experimental, cognitive, and linguistic evidence exists to argue for braille as primarily one or the other?
* How does the pedagogical literature treat braille regarding these approaches?
* Why is it better for teachers (and learners) to approach braille as a 'writing system'?
* What future work needs to be done to address these concerns?

## 12:4 Dedicon Math Notation

### Is a Braille Code indispensable?

### **Dorine in ‘t Veld**, Product manager at Dedicon Educational

Tactile support is indispensable for doing math, certainly on a more advanced level. But is a Braille Code indispensable? In the Netherlands students hardly ever read math from printed braille. The math notation they use for reading and writing, is not a braille code, but a kind of (standardized) ‘calculator-language’. It was established in 2009 by a group of teachers for the VI for use in primary and secondary education. Since that same year Dedicon Educational produces math books with this notation, that only uses keys that are on the qwerty keyboard and can be used in Notepad, Word, Markdown or any other editor and is easy to read for sighted class mates and teachers.

Many specialists would think a braille code for math is needed to do more advanced braille, but our experiences challenge that opinion. We see an increasing number of students doing math on higher level. This is very positive, since math is compulsory for computer science and related studies that are popular amongst braille students. When asked, students say they don’t want Dedicon to work on a Braille code for math, but expand and further improve the notation instead. E.g. some descriptions are rather long, not all academic math notation is covered.

For automated production through MathML, which will make it possible to implement the notation into many math programs some rules must be stricter, e.g. for the use of parentheses or spaces. The notation allows internationalization and has the potential to become a valuable addition to or alternative for a math braille code in many situations.

In this presentation the audience will learn:

* The main causes for this historically grown situation (which is not as unique anymore as it was a couple of years ago).
* Personal perspective of a student
* The main principles for this notation
* How we improve notation and production

# Session 13

## 13:1 Conquering Complexity

### Student Strategy Use to Understand Tactile Graphics

### **Kim T. Zebehazy**, Associate Professor at the University of British Columbia

Results of a survey of students with visual impairments indicate that they like to have graphics available to feel included with their peers, but that they do not necessarily find tactile graphics useful for understanding concepts (Zebehazy & Wilton, 2014). In addition to attending to the creation of quality graphics, what from the instructional side can be done to enhance student ability to understand and gain information from tactile graphics? This presentation will share results from a study that investigated the strategies used by students with visual impairments when reading typical math graphics (e.g., bar graph) and a social studies graphic (i.e., a map). Students were video recorded and asked to think out loud as they engaged with five different tactile graphics varying in complexity to answer multiple choice questions. The presentation will highlight the strategies and hand movements used by the most successful students. Relationships between successful graphic reading and demographic information such as teacher rating of problem solving skills and instruction in graphics use will also be highlighted. What the results might mean for teaching other students to be confident tactile graphics readers will be discussed.

Participants will:

* learn about the variations in strategies used by students with visual impairments when reading simple to more complex tactile graphics at different grade levels.
* experience how asking students to think aloud can inform instruction.
* learn and discuss ways to help students improve problem solving around tactile graphic reading.

### References

* Zebehazy, K.T., & Wilton, A.P. (2014). Straight from the source: Students with visual impairments’ perceptions about graphic use. Journal of Visual Impairment & Blindness, 108(4), 275-286.

## 13:2 Accessing Tactile Graphics

### Evaluating the use of Variable Height in Statistical Tactile Graphics

### **Richa Gupta**, PhD Scholar, Indian Institute of Technology Delhi, India

Creation of effective tactile resources is critical to inclusion of persons with visual impairment and blindness in education. This research work focuses on the design of accessible forms of statistical graphics. Gaining insight into and understanding of tabular data is a highly demanding task for people with visual impairments. Since, tactile perception uses sequential information acquisition rather than the parallel acquisition used by the visual system, it is a challenge for blind students to gather a fast overview of and deeper insight into the data through tactile modality. The morphological elements of design mainly used for designing tactile diagrams are points, linear, and areal elements. These design elements are two- dimensional in nature. However, since three-dimensional design has become possible with modern manufacturing techniques, volumetric variations have come to be used in tactile diagrams. In this light, this research work aims to explore the use of variable heights in the context of statistical representation like, pie charts and bar graphs. The key questions that this work attempts to answer are: Is it possible to extend the range of a discriminable set of design attributes by using volumetric elements like height contrast? Can some formal variations of tactile diagrams using height contrast be distinguished using the sense of touch? The aim of such an investigation is to make tactile educational resources more effective and accessible to blind students.

From this presentation, participants will learn about:

* the tactile perception of height variation and their effectiveness in the context of statistical tactile diagrams
* height variations that are distinctly discriminable through tactile perception
* previous experiments done with height variations in tactile diagrams
* technologies and techniques that can be used in making three dimensional tactile diagrams
* views of special educators and visually impaired and blind students on the use of height variations
* experimental results from field studies conducted in this regard in India

## 13:3 Optimizing tactile images and maps for learning materials

### **Riitta Kangasaho**, Consulting teacher and **Tuija Piili-Jokinen**, Consulting teacher at the Valteri Center for Learning and Consulting, Onerva

Authors: Riitta Kangasaho, Consulting teacher, Valteri Center for Learning and Consulting, Onerva, Seppo Mallenius, Production manager, Celia, Tuija Piili-Jokinen, Consulting teacher, Valteri Center for Learning and Consulting, Onerva, Mikko Pousi, Learning material designer, Celia and Hannele Wilkman, Learning material designer, Celia

The main idea of this project was to limit the production of tactile images only to the relevant ones and to create sets of images which can be used with the books of the same subject e.g. biology, geography or history from all Finnish publishers and which conform the national curriculum in Finland

Subject-specific tactiles.

Celia has developed and produced tactile materials for visually impaired for decades. An important target group is children who use tactile images and maps as part of school books written in braille or in electronic format. The teachers and staff ordering materials from Celia have reported that to select relevant tactile images has been challenging, because the amount of images within each book is huge and there is not enough time to make use of all the delivered images. Therefore, in 2014, Celia and Valteri Center for Learning and Consulting, Onerva (former The School for the Visually Impaired in Jyväskylä) started a project to renew the production of subject-specific tactile images and maps used in learning materials. The basic idea of the project was to limit the production of tactile images only to the relevant ones and to create sets of images which can be used with the books of the same subject e.g. biology, geography or history from all Finnish publishers and which conform the national curriculum in Finland. These sets include also pedagogical tips to activate not only the visually impaired pupil but the whole class. The image sets were also supplemented with the printed explanations of each image and table contents serving pupils’ teachers and assistants. The feedback of this renewal from schools has been positive.

The benefits:

* decrease the amount of tactile images to the relevant ones
* support inclusion in the classroom
* use the sets independently of publishers’ class books
* save costs of production and deliveries

## 13:4 ”Art does not have to be visual”

### Students with visual impairment and their art teachers about motivation in art

### **Anneli Embe**, Special education teacher, National agency for Special Needs Education and Schools

The aim of this study was to shed light on what may be motivating in art studies for young people with visual impairment or blindness and with Braille as reading medium, in inclusive education, grades 7– 9. Questions for the study were: What are the students’ experiences of art studies with focus on their motivation? What are the art teachers’ ideas on lesson planning with focus on creating motivation in inclusive art education?

The study was conducted with semi-structured interviews analyzed with a phenomenological approach. Observations of the students were conducted in order to get an impression of the students in the art class. The study included four students and their art teachers, which resulted in eight interviews and four observations. Three of the students had blindness and one had severe vision loss with a visual acuity of 0.05. All acquired vision loss before birth.

What basically motivated the students was creating together with sighted classmates, no matter how difficult it was. In art the differences become especially clear. Demands on planning and adapting are high and it is difficult to fully customize. Tactile experiences constituted strong memories that stayed with the student for many years.

To make art meaningful for a student with visual impairment or blindness lessons for the entire class need to be planned with focus on open tasks with different choices. Knowledge without demands on the visual sense is crucial and so is the creation with three-dimensional and tactile techniques.

Keywords: Visual impairment, blindness, art, motivation in art, tactile images

* Consolidating knowledge through tactile experiences
* Possibilities and difficulties in including art education.
* Consequences for student when art teacher lacks further training.

# Session 14

## 14:1 Recognizability of tactile graphics

### Evidence from analysis of drawings made by learners with a visual impairment from different cultural backgrounds

### **Boguslaw Marek**, Ph.D., Order of the British Empire

Authors: Bogusław Marek and Magdalena Szubielska from the John Paul II Catholic University of Lublin and Ewa Niestorowicz from the Madam Curie University

The paper focuses on formal characteristics of drawings made by congenitally blind children and teenagers and on reorganizability of these drawings by sighted persons. The analysis is based on a study involving Polish subjects aged seven, and on drawings made by participants of tactile graphics courses in Nepal, India, Singapore and Samoa. As an additional goal of the study, effectiveness of several educational resources was investigated as tools helping understand the relation between objects and drawings, as well as their influence on accuracy and reorganizability of drawings made by blind subjects. The study revealed that the *Transfograph, Fleximan, Space Organizer* and *Setting the table* considerably improved first time users' of tactile graphics ability to understand drawings of objects and of spatial relations obtaining between objects represented graphically. Reorganizability of drawings made before and after training with the above tools varied from subject to subject but given a prompt as to what the drawings represented, sighted judges found those made after the training more easily identifiable.

A conclusion drawn from work done with subjects is that training with the use of appropriate resources can help congenitally blind persons make up for delays in the development of drawing skills caused by lack of opportunities to engage in drawing and in exploring tactile graphics.

## 14:2 Tactile images: production, dissemination, pedagogy

### **Hoëlle Corvest**, President of DUGTA Association

The opportunities of gaining knowledge about the real world by means of touch, either through two-dimensional or three-dimensional media, remains very limited for severely visually handicapped people. Research that was carried out separately in Italy, Sweden and France between 1987 and 2000, all came to similar conclusions about:

* The usability of orthogonal projection for the tactile representation three-dimensional subjects.
* Criteria for tactile readability
* Technical and methodological research in order to realize tactile images in publications dedicated to subjects public interest for a small number of readers.

However, visually impaired persons, young or adult, need to be trained properly and quickly in reading tactile images. Working in the The Cité des Sciences & de l’Industrie in Paris I have – in cooperation with the Louvre Museum developed training programs for a large number of interested blind persons and professionals since 20 years. This allows me to testify that the acquisition of the principles of graphical representations brings a palpable joy while discovering the ‘sense’ that is transmitted by tactile images. We also developed concepts for publications that combine tactile and large print images with accompanying text in braille, large print and audio, that are available at a reasonable price. The Cité edited 8 non-specialist books (collection ‘à Voir et à Toucher’), the Louvre published 5 works (collection ‘Un Autre Regard), the Éditions du Patrimoine prepare their 6th production (collection Sensitinéraire). In order to raise the production and dissemination of tactile images for a small number of people who are wanting them very much, we propose to form an international group that will edit, propagate and disseminate affordable high-quality tactile books in different languages, opening to the hands the exploration of many domains of knowledge that ‘only words’ cannot reveal to those who cannot see. Access to tactile representations is indispensable to enable true cultural participation and social integration.

This presentation will cover:

* Program and structure of the workshops
* Structure of existing publications and lessons learned
* Concept for future publications

## 14:3 Tactile images

### Project results ‘Discover your world’

### **Thessa Stevenson-Doosje**, teacher at the Bartiméusschool

In 2012 the long-term research and development project ‘Discover your world’ was initiated by Bartiméus Education since hardly any research to the use of tactile images in an educational setting was available. Tactile images in The Netherlands had mostly been used for maps, plans, schemes, diagrams and other two-dimensional topics. For explaining 3D concepts predominately descriptions were used, mostly due to prominence issues which in hindsight are ascribed to false expectations among teachers. A major falsification was the idea that students required the ability to mentally represent an image in order to understand the concept that is displayed.

The combination of a tactile image with an effective description proved invaluable for a beneficial educational experience for students. Furthermore, the direction of hand movements by the students proved valuable in understanding the depicted concept. Multiple examples of successful tactile images will be presented and accompanied with a detailed description of their impact. Additionally, examples of tactile images increasing the effectiveness of 3 dimensional models will be presented.

The audience will learn:

* How tactile images can contribute to acquire knowledge of concepts for blind students.
* The optimal method to present a tactile image to a student, leading to the desired learning outcome.
* Effective guidance during the learning experience with tactile images and how to develop the required descriptions.

## 14:4 Inclusive Design of Tactile Story Graphics and Objects

### Engaging Blind People to Write their Own Story, and Design Their Own Tactile Graphics

### **Abigale Stangl**, PhD Student- ATLAS Institute, University of Colorado and **Ann Cunningham**, Tactile Artist and Educator- Sensational Art

Authors: Abigale Stangl, PhD Student- ATLAS Institute, University of Colorado, Ann Cunningham, Tactile Artist and Educator- Sensational Art and Jeannie Saracino, Elementary Education Licensure Candidate, University of Colorado

People who are blind often lack opportunities to engage in fine art and multimodal composition activities, let alone the design of tactile graphics and tactile pictures. This can be attributed to limited time and teaching resources, lack of educators’ understanding about the requirements to engage blind people in art and design practices (Coleman et al. 2015), and a dearth of tactile artwork to support this population to be familiar and comfortable with art and tactile graphics and pictures. In 2008, Aldrich challenged practitioners and researchers to find out whether, and how, the design of tactile graphics might differ profitably from that of visual graphics (Aldrich 2008). We present an effort that positioned people with VI to co-design tactile graphics, pictures, and objects from a tactile perspective under the guise of co-writing a story and developing accompanying tactile materials. Over the course of nine weeks, we designed and implemented a curriculum using a design-based research method (Brown 1992), in order to support people who are blind gain the skills, dispositions, and critical perspectives necessary to practice and develop tactile literacies and create unique tactile graphics and objects. We report on the activities, facilitation methods, and participation structures that supported participants in gaining skills, developing their identities/dispositions, and critical perspectives in regards to tactile literacy.

While attending our presentation, conference participants will gain:

* A theoretical and methodological preview of inclusive design education for people with VI (e.g. Coster and Loots. 2004, Penketh. 2014; Hendriks et. al. 2015)
* Overview of our study design and findings pertaining to creating opportunities for people with visual impairments to create their own tactile learning materials
* Universal design strategies for teaching multimodal composition to people with visual impairments.

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* Ann Brown. 1992. Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. The journal of the learning sciences, 2(2), pp.141-178.
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* Karin Coster and Gerrit Loots. 2004. Somewhere in between touch and vision: In search of a meaningful art education for blind individuals. International Journal of Art & Design Education 23, 3 (2004), 326–334.
* Niels Hendriks, Karin Slegers, and Pieter Duysburgh. 2015. Codesign with people living with cognitive or sensory impairments: a case for method stories and uniqueness. CoDesign 11, 1 (January 2015), 70–82.
* Claire Penketh. 2014. Putting Disability Studies to Work in Art Education. International Journal of Art & Design Education 33, 3 (October 2014)

# Posters

## Exploring Pictures

### What qualities can we use to make a picture informative?

### **Ann Cunningham**, owner Sensational Books, art teacher at the Colorado Center for the Blind and tactile artist

Just like visual art, tactile art can engage our mind in some surprising ways. Come and see if you are able to experience some tactile sculptures in ways that might inspire you to see new possibilities for your tactile images.

[www.acunningham.com](http://www.acunningham.com) / [www.SensationalBooks.com](http://www.SensationalBooks.com) / [CoCenter.org](http://cocenter.org)

## Dawn Wilkinson

Dawn will demonstrate alignment of particular APH products within the categorical framework of the Tactual Profile and discuss ideas for implementing the Tactual Profile as a standard assessment included in a student’s individualized education plan.

## De Blindas Bokfond

A Historical Art Overview is a book project consisting of braille text and tactile pictures, produced to give blind people a possibility to experience art over the centuries. It describes prominent traits within genres like art, design and architecture. The volumes are compiled of a text part and files with tactile pictures, with significant features from each period. There is also written descriptions of the pictures.

The texts are written by Camilla Hjelm and Tomas Björk. The tactile pictures are produced by Annica Norberg and the volumes are edited by Professor Yvonne Eriksson. A Historical Art Overview is an initiative by the foundation Stiftelsen De Blindas Bokfond. The foundation, which for 100 years has produced literature in braille, has also funded the project. So far two volumes have been produced. A third volume is currently being planned.

## Touch your book

### The formation of a collection of tactile books

### **Dorine in ‘t Veld**, Product manager at Dedicon Educational

In 2014 Dedicon created a tactile library for children aged 2 – 8 for the ‘Reading for All’ Library in The Netherlands. They studied examples from all over the world and then they selected books to translate and add to the collection. In 2016 the collection counts 34 titles and can be loaned by parents and teachers through the website [www.voeljeboekje.nl](http://www.voeljeboekje.nl/). Images vary from real 3D objects and images that were created using different textures, to line drawings in different techniques. Some books were originally designed for blind children, others are transcriptions of mainstream books.

Dorine will present a poster and talk about the experience they have gotten from this project and the practical issues they came across during the translation.Reading

## I can draw!

### Using HIPP to learn about 2D representations and drawings

### **Kirsten Rassmus-Gröhn**, associate professor at Lund University

Authors: Karolina Björk, Anpassningsbyrån, Ingegerd Fahlström, GotIT resurscenter, Region Gotland, Charlotte Magnusson, Design Sciences, Lund University, Delphine Szymczak, Design Sciences, Lund University and Kirsten Rassmus-Gröhn, Design Sciences, Lund University

There is as yet no standardized technology that gives pupils with blindness access to, and also means to create their own digital graphics. In a society where more and more school material is available and created on-line, pupils with severe visual impairment are still forced to use mainly physical material. The preparations needed for creating physical material usually limit the number of educational tactile graphics created. Because of this, pupils with blindness get less training in reading and interpreting graphical material. We have developed an audio-haptic non-visual image editor and explorer: HIPP (Haptics In Pedagogical Practice). It combines haptic and sound feedback. Haptic feedback is displayed via the PHANToM OMNI device, speech provides precision and detail, while sound effects can give context or enhance motivation.

Ten pupils were involved in the development and evaluation of the application and used it for both drawing and accessing digital graphical material. We have seen that learning to draw and being inspired to draw is possible with the help of HIPP. Drawing can be approached in two ways: by doodle drawings that are visually interpreted, or starting from the initiative of a pupil wanting to draw something particular. Printing swell paper copies of the drawn pictures, sometimes in several stages before the picture is finished can help making the build-up of pictures clearer to the pupil. The task of drawing something triggers questions about how real world objects are constructed. Furthermore, this puts focus on 3D-2D projections and conventions in drawing (for example how you usually draw a car from the side, and not from the top).

Using HIPP primarily as a transmitter or conveyor of school material such as maps, drawings and diagrams, has not worked as well. In the cases where the conveying of material was the focus, the HIPP application was used less. Partly because without the embodied knowledge of what a picture is and how you create it, the decoding and understanding of graphic material is much harder. It also puts a greater demand on the assistants or teachers creating the material, and spending preparation time working with HIPP.

Participants will learn:

* What digital haptics are and how it works in practice
* How HIPP was used in the project and could be used to learn how to draw
* Good examples of how to combine haptics, sound and speech in HIPP
* How digital tactile material could be used directly with HIPP without teachers needing to tailor all their own material

## Introduction of Newly Production Method to Create In-school Tactile Guide Maps for Children with Visually Impairments

### Using New Production Device of Tactile Guide Map Made by Transparent Resinous Ultraviolet Cured Type Ink

### **Kouki DOI**, Chief Researcher, Ph.D., National Institute of Special Needs Education

Authors: Kouki DOI, Chief Researcher, Ph.D., National Institute of Special Needs Education, Takahiro NISHIMURA, Researcher, Ph.D., National Institute of Special Needs Education, Tsutomu WADA, Manager, Ph.D., Japan Braille Library and Hiroshi FUJIMOTO,Professor, Ph.D., Waseda University

Information support for children and adults with visually impairments is necessary to back up their independence activity. From teachers at special needs school for students with visually impairments, there is a demand for information support tools that ensure students with visual impairment have access to necessary information inside school buildings. Teachers and students at special needs school for students with visually impairments require tactile guide maps that allow the students to grasp the arrangement of school buildings and classrooms. On the other hand, because understanding space information by reading tactile guide maps is quite difficult, audio information support is also required.

The aim of this study is to establish a newly production method to create in-school tactile guide maps (trial version) that can allow students with visually impairments at special needs schools for students with visually impairments to grasp the arrangement of school buildings and classrooms. We developed a printing machine to create Braille and tactile guide maps using ultraviolet curable resin ink, and created tactile guide maps with high tactility experimentally. We also develop a voice-reading interface (pen type) that allows students with visually impairments to obtain audio information from tactile guide maps. In addition, we conducted interviews with teachers and students at special needs school for students with visually impairments to investigate the ease of use of in-school tactile guide maps. From this interviews, we found that the tactile guide maps developed in this study have highly usability for almost of all of participants in this interviews. This study led to the proposal of a newly production method to create in-school tactile guide maps that allow students with visually impairments to grasp the arrangement of school buildings and classrooms.

## The Moles Game

### A board game for visually impaired children and youth

### **Laura Kalola**, Designer and Bachelor of Culture and Arts

I´m an object designer from Tampere, Finland. I’ve always loved playing the board games. I

think it is the best way to spend time with family and friends! While studying at the Lahti Institute of Design in 2010 I began to design my own board game. I did some research and noticed that the majority of the board games in the market are based on the sense of sight. Visually impaired people are not taken into account when designing board games. That is why I began to develop a board game that visually impaired and normally sighted people could play together. Most of the ready games for visually impaired are intended for preschoolers. The commercial board games that suit for visually impaired, school aged and adults, can not be found at all, so I wanted to design a game for them.

Now after years of development and testing, ”The Moles Game” is ready for sale. It´s a wooden board game for four players. The minimum age limit is eight years. The game board and the tokens have been tested with visually impaired children and youth. Playing the board game develops visually impaired´s fine motor skills, and it can be used for recreation, education and rehabilitation purposes. The product idea won the Assistive Technology Competition 2011 in Finland. My dream is that visually impaired children and youth could soon play this game in schools and at homes with their families.

[www.themolesgame.com](http://www.themolesgame.com)

## Origami's haptic qualities

### "I feel, I understand and I'm able to replicate"

### **Sabrina Morisson**, Design for All conceptor

"As a blind person who has never seen, I have to collect all the details to recreate an image and to understand its 3D perspectives." With these tactile origami books, visual impaired and blind people can reach two specific goals: build a mental representation of volume and replicate the form by themselves by exploring all the folds in the paper. Guided by the choice of steps, the color contrasts and ~~t~~extures on the paper, the shape of the book and tactile guides, the user will get a better understanding and concentration span. This method is the result of observations and activities over a two years period in various workshops with adults, teenagers and children with different types of disabilities, and also with the professionals of Les Doigts qui Rêvent (France) and Institut Nazareth & Louis-Braille (province of Québec, Canada) working daily with visually impaired people.

Through this project, I could share my work and many observations on:

* Strategies used by people with visual impairment and blindness to build their own mental representation of a 3D image.
* Techniques to create an intuitive tactile and focused exploration.
* Storage process and links between recognizing forms, understanding the movement of folding and replicating it by oneself.
* Difficulties for a graphic designer to overcome his own visual perception and mental process.
* Analyzing users during the activity of folding paper and how they extend their cognitive development

## Japanese situation about Tactile Guide Map in public facilities

### Proposal of Tactile Guide Map design principles based on human cutaneous sensations

### **Tsutomu WADA**, Manager, Ph.D., Japan Braille Library

Authors: Tsutomu WADA, Manager, Ph.D., Japan Braille Library, Kouki DOI, Chief Researcher, Ph.D., National Institute of Special Needs Education, Takahiro NISHIMURA, Researcher, Ph.D., National Institute of Special Needs Education, Harumi MATSUMORI, Mayu KATAGIRI, Manager, Ph.D., Japan Braille Library and Hiroshi FUJIMOTO Professor, Ph.D., Waseda University

By enforcement of "Barrier Free Act", various tools designed for disabled and/or elderly people have been widely implemented in public facilities such as railroad stations, city halls, parks, etc. in Japan. Tactile Guide Maps are one of those tools for guiding blind and visually impaired persons. Although the trend itself is desirable for the handicapped persons, some problems still remain to be solved for Tactile Guide Maps. Those problems are as follows: wrong braille letters, too big or too small map size, too high or too low setting position for reading, complex and/or useless information for blind users. They are occurred by lack of design principles based on human cutaneous sensations.

For improvement of these problems, the standardization of design principles for Tactile Guide Maps are most effective. Based on the discussion about the appropriate setting position, proper size of map board, useful and well-chosen information for orientation and mobility and other requirements, the JIS(Japanese Industrial Standard) for Tactile Guide Maps was published in 2016. We made some surveys to determine useful evidence for this standard, mainly on tactile markings. In this presentation we explain some of our surveys, 1) the discriminability of one and another raised stripe patterns which are different distance of line, 2) perception of texture with dot pattern and striped pattern on Human Forefinger and 3) standard tactile mark selection survey. These results will be useful in creating more effective tactile patterns and marks for use in Tactile Guide Maps.

# Exhibitors

## AEL Data

At AEL Data, we provide braille transcription and tactile graphics services. Our mission is to make it easy for visually handicapped people to explore and learn the strange system of braille (the six dots).

With over 15 years of experienced in accessibility services AEL fully understands and complies with the standards and guidelines of BANA, CBA and UEB (contracted and uncontracted).

BRAILLE TRANSCRIPTION

* AEL Data complies with the standards set forth by Braille Authority of North America (BANA), and Unified English Braille Code (UEB) which is a subset of BANA.
* AEL Data has a large team with vast experience and are able to convert the documents to high quality Grade 1 (Uncontracted) and Grade 2 (Contracted) Braille.

TACTILE GRAPHICS

* AEL Data has been producing Tactile Graphics for several years to many European NPO’s and libraries in compliance with the Braille Authority of North America (BANA) standards, Canadian Braille Authority (CBA) standards.
* AEL Data have a team of Expertise Tactile designers and the images will be analyzed thoroughly before creating the Tactile graphics with the aspects of pattern fill types, placement of Braille labels, avoiding unnecessary information and cluttering and techniques for illustrating complexity. AEL has processed around 50000+ images as Tactile graphics which includes Graphs, Human Anatomy, Maps, Chemical Equations, Physics and Engineering over the last3 years.

[www.aeldata.com](http://www.aeldata.com/)

## Annica Norberg Design

Annica Norberg Design is a one-man company with considerable experience of tactile images of different techniques and materials such as swellpaper, screenprint and collage images. I will show examples of images in different techniques and how I work in the "translation" from visual to tactile images.

<http://www.annicanorberg.se/>

## Harpo

Harpo’s mission is to create solutions for people with vision and communication impairments so that they could interact with the world, to realise their ambitions and to help make the world see them for the talented people they are. Our products have been delivered to all corners of the world. All of our products provide quality, innovation and practicality, that our customers are looking for. We are proud of:

* The Mountbatten Braille Whisperer, the leading complete Braille learning centre for children and their teachers
* BraillePen 12 Touch - superbly portable, amazingly affordable, with easy keyboard action and enviable battery life notetaker
* Tactile Image Maker PIAF – device that produces high quality tactile graphics using heat sensitive capsule paper, simply - tangible magic!

[www.int.harpo.com.pl](http://int.harpo.com.pl/)

## HUNGRY FINGERS

### Educational Tools for Young Learners with Special Needs

Hungry Fingers is a one-man company specializing in designing and producing educational tools for young learners with a visual impairment. The tools are designed to give visually impaired children the confidence that with poor vision, or even without sight, they can be in command of the space around them. They can learn how objects are related to one another, and why they look, or feel different when we draw them.

At the Tactile Reading conference Bob Marek will exhibit a series of resources making „A Tactile Graphics Primer” - a step-by-step introduction to tactile diagrams helping understand the relation between objects and drawings. The series includes:

* Shape detective 1-5
* Space organizer
* Transfograph,
* Symmetrograph
* Rotograph
* „The title of this book is…” (learnig about body parts while drawing a teddy bear)
* Fleximan and „Playing and learning with Fleximan” – understanding drawings of people performing various activities
* Tactile graphics games for O&M and understanding of difficult concepts
* Magic quiz board and Mutliple choice frame – educational tools for stress free testing, checking understanding of tactile graphics, general knowledge etc.

[www.hungryfingers.com](http://www.hungryfingers.com/)

## Index Braille

Located in north of Sweden, Index Braille is the market leading braille printer producer with 70% of the global market share. We have 14 employees working on the development, marketing, and production of Index braille printers.

Our product portfolio includes Everest-D and BrailleBox for cut-sheet paper, and Basic-D for tractor-fed braille paper, all supporting printing of high resolution tactile graphics.
At the conference Index presents Everest-D V5 and demonstrates the printing of tactile graphics from a computer and directly from a USB flash drive and mobile phone.

[www.indexbraille.com](http://www.indexbraille.com/)

## Insyn

To point out that the importance of Braille become more and more important. In today's information society where you are forced to keep up, the meaning to use braille becomes very important for visually impaired person.

Insyn have considerable expertise in this field. We will show braille devices connected to computer, tablets and smartphones. Products to learn braille and use. We also know how to produce braillematerial fast and simply.

## Iris Hjälpmedel (Iris Assistive Aids)

Iris Hjälpmedel (Iris Assistive Aids) represents several solutions within braille and tactile for learning and an active daily life. Let us show you the Perkins SmartBrailler, a product that combines low vision, hearing and tactility for an active learning process, youth as well as adults. Or make your own tactile map or drawing. Experience our wide range of different solutions that are good for everyone, but necessary for some.

[www.irishjalpmedel.se](http://www.irishjalpmedel.se/)

## Les Doigts Qui Rêvent (Dreaming Fingers)

Les Doigts Qui Rêvent (Dreaming Fingers) will exhibit different kind of tactile illustrated books (TiB) for visually impaired (partially sighted & blind), mainly illustrated with textures; educative TiB, preschool TiB, youth literature TiB, artist’s TiB. All are made in France by our manufacture workshop (social economy).

[www.Ldqr.org](http://www.ldqr.org/) / [www.tactus.org](http://www.tactus.org/)

## LVI Low Vision International

Our philosophy: With the mission to make every day easier for people with visual disabilities, LVI Low Vision International designs and develops products with high standards for reliability, simplicity and serviceability.

LVI is recognized as one of the world´s leading manufacturers of equipment for visually impaired people. Our head office is located in Växjö, Sweden. The company is going from strength to strength and there are currently 55 people working within the organization. Through our subsidiaries and distributors, we are also well represented worldwide. LVI's subsidiaries are located in Denmark, Finland, Germany, Norway, Belgium and Switzerland.

All development and manufacturing takes place in our head office in Sweden. It is a great advantage to have everything within the building, from production to finished product as well as sales and service. New products are developed in close co-operation with users and professionals within the low vision rehabilitation industry. Our products are sold under the registered trademark MagniLink.

In the year of 2013, LVI celebrated 35 years in the industry. With a wider product range and strength both nationally and internationally, LVI will work towards even more innovative solutions that will make every day easier for people with visual disabilities.

Meet us at the exhibition!

We will present the Esys braille display. Esys is much more than just a braille display with keyboard, it features internal applications such as notepad, agenda, alarm clock and a calculator which can be used either independently or the information stored on the included micro SD-card.

Connected through Bluetooth or USB, Esys assists you to navigate through the different applications in your phone, tablet or computer in order to read or write emails and text messages, manage your contacts or surf the Internet.

Compatible with all screen readers (Jaws, VoiceOver, NVDA, Talk-Back / Braille-Back, SuperNova, etc.), Esys can be used with your existing hardware (Windows, Mac, Android, Linux).

Especially designed for the persons with vision loss, the duo Esys + Esybraille offers all the tools necessary to manage printing in Braille, black ink characters or a combination of both\* (text, mathematics, music, etc.)

Choose the right model (number of cells) for your needs:

12 cells : the perfect smartphone companion

24 cells : mobility without compromise

40 cells : your computer's partner

64 cells : ideal for educational and professional use

80 cells : your choice for the work environment

[www.lvi.se/en/](http://www.lvi.se/en/)

## Mokomoko Group and Suzulan Bunko

Misako Nomura is working at the Japanese Society for Persons with Disabilities as an adviser. She is a volunteer that will promote products made by two volunteer groups from Japan; Mokomoko Group and Suzulan Bunko. She will show cloth picture books which are easy to read books for all children. She will describe how the tactile cloth picture books helps the development of reading skills for children with intellectual disabilities as well as for non-disabled young children. The DAISY version using such cloth picture book is also described.

## Picture Books Plus

Picture Books Plus supports the idea of inclusive education. Children with a visual impairment should be able to read the same picture books as their sighted peers so they can participate. The method involves existing, popular picture books that are completely remade, with drawings in relief and the story in Braille and large print. The books are made of durable materials. In the set enclosed are the original picture book, a reading manual with information and instructions for teachers plus one or more objects for the children to feel.

<http://prentenboekenplus.nl/en/home/>

## Reach and Match

### Achieving inclusion among children with and without vision impairment - Reach & Match Fun for All

Reach & Match® is an innovative and research-based education kit to empower children with vision impairment and complex needs to develop braille literacy and essential childhood skills through a welldesigned inclusive learning program. The research of Reach & Match® has included trend of braille application, braille learning & tactile development for vision impaired children, essential emotional development and functional skills for children with multi-disabilities.

Reach & Match® Inclusive Learning Program is a secondary development (9 months field-testing) from collaborating with the early educators, therapists and parents to design the activities for early intervention. 30+ activities and games are designed based on 7 learning outcomes: Braille Learning, Cognitive Skills, Sensory Integration, Sense of Satisfaction, Language Enrichment, Body Movement and Social Interaction. We designed meaningful activities which focus on exploration, interaction and active movement. Children and teachers are inspired to design their own games, with the best ideas selected and added into the Inclusive Learning Program, hence a community within teachers, therapists and parents is created.

The whole kit is composed of different parts: • 4 double-sided sensory play mats • 26 braille & print double-sided sensory tiles containing 4 sounds • 1 cushion • 1 portable bag • 1 Reach & Match® Inclusive Learning Program (30+ Activities & Games)

[www.reachandmatch.com](http://www.reachandmatch.com/) / [2-min Video](https://www.youtube.com/watch?v=9RnuRuazOtc)

## Scandic Screen

Scandic Screen is a one man company, started in 1988 in Copenhagen. I have 8 years experience in screenprinted braille and relief varnish. Scandic will show examples off screenprinted jobs and combined digital/screenprinted jobs. My ambition and goal is to develop a simple braille print technic for short runs.

## SG Access AB

SG Access AB is a unique company within the signage and wayfinding industry. Our goal is to improve what should be for granted - Everyone should have the chance to access information and maps in the public domain regardless of vision or language or not. SG Access AB focus on developing products that are simple to understand and easy to use. Neat things like a gadget to measure "folding money" a very well-designed product to solve What could be everyday problems. Signs to inform about and identify your environment. Always with an opportunity for smart thoughtful extras.

With our expertise we are specialized in ingenious products with high usability. We have developed specialized processes, know-how and years of experience, so we call us experts in custom Visual, Braille, Tactile signage and maps. Our clearly visible and tactile signs can be manufactured to custom designs and requirements in a wide range of colors and materials. We use high color contrast acrylic as well as metal or clear transparent acrylic for overlay and carefully thought through things.

Visit us at our exhibition booth and use your senses to look at and touch our products:

* Handrail direction signs
* Folding money meter gadget and Rulers
* Handheld portable maps
* Evacuation How-to instructions and Emergency Evacuation Maps
* A number of Tactile maps with smart thoughtful extras.

To do the best possible visual, tactile and universal design is an ongoing challenge to develop. Given the best opportunity by implementing universal standard as good as possible.

[www.sgaccess.com](http://www.sgaccess.com/)

## Tactsenze

Developing Tactile Stimulation for Music - and Beyond

Our start-up, Tactsenze has produced a prototype which allows visually impaired musicians to interpret a conductor’s hand movements. Wu Jing, a blind flautist made history by playing with the Stockholm Royal Philharmonic Orchestra with the aid of Tactsenze technology. The key here is that she did not play as a soloist, but as an integrated member of the orchestra.

Ric Wasserman, project manager, will demonstrate our prototype and present some ideas for further developing the technique. Our goal, is to develop a tactile-based communication tool for the visually impaired and deaf-blind community.

[www.tactsenze.com](http://www.tactsenze.com)

## Zychem

Zychem Limited are manufacturers and global suppliers of ZYTEX2 Swell Paper for the manufacture of tactile diagrams. We will be showing both the paper and the ZYFUSE Heater, allowing the customer to produce simple but clear and effective raised images which can be read by the blind.