SUZUKI's Education for the Blind Students

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Edition

Look by Ears, Read by Hands, Walk by Head

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What is unique about education for children with visual impairments?

When teaching students with visual impairments, people might assume that they will never be as successful as those who have normal vision. However, many children with visual impairments grow to be very talented and even smarter than their seeing peers. Therefore, we should teach them essential skills as early as possible to help them reach their highest potential. The essential skills they need to master will be referred to as look by ear, read by hand, and walk by head.



Look by ears

Look by ears is understanding the environment and processing it using auditory information sensed by the ears. Children with visual impairments can "see" what is behind them even without turning around. Their ears can grab auditory information simultaneously from all directions.

Read by hands is reading braille to understand the environment, reading tactile signs or maps using the hands, as well as using them to weigh objects or sense temperature.



Read by hands



Walk by head

Walk by head is navigating a route and reaching the destination through orientation while using mobility skills. Blind children can move to the target location by using a cane once they learn how to read tactile maps.

1. LOOK BY EARS

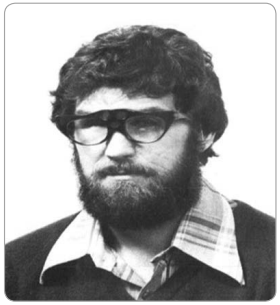
1. How Sounds and Echoes Inform Children with Visual Impairments

People who teach children with visual impairments are often surprised to see the student's amazing sensitivity to sound. For example, they can identify a person just by listening to their footsteps and recognizing the pattern. They also find intersections when walking down the street by listening to the sounds of traffic.

Clues of sounds and echoes. Sounds, are those coming directly from car engines or tires, footsteps, or music played by shops along the street. It is easy to gain information from these sounds in the surrounding area. Echoes come from a cane's tapping or footsteps, and these also render clues. Children with visual impairments can catch slight differences in the echoes when the sounds bounce off walls, fences or other objects. Therefore, if there is a tree or pole or telephone box on the street, blind children will identify it by listening to the echoes.

Once a blind child has learned how to recognize and distinguish various sounds and echoes, it is time for them to practice in the real world.

2. Technology Using Ultra Sonic Waves: The Sonic Guide



Sonic Guide

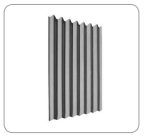


K-sonar

The Sonic Guide is assistive technology that tells the distance of an object. It sends ultrasonic waves in the direction the user is facing and relays audible acoustic signals; 1m is signaled by the sound of 1khz, 2m by 2khz, 5m by 5khz, and so on. Besides just telling the distance, it can also identify the type of object. Its signal varies depending on the type of material the sonic wave bounces off of.

The Sonic Guide plays the role of a magnifying glass to users because it provides more detailed information of the environment. The same material will have two different sounds, depending on whether the user is moving or standing still. It offers clear information to the user who can then compare the sounds to know what is ahead.

Examples of acoustic signals when user is moving or standing still

OBJECT	 Telephone pole / concrete	 Streetlight / iron	 Waved Fence
SOUND			
Moving(移動中)	Pin Pin!~	Pin Pin!~	Shufin Shufin~
Standing Still(停止)	Bin Bin~	Pin Pin~	Rion Rion~
OBJECT	 Wired Fence	 Bush Fence	 Brick Wall
SOUND			
Moving(移動中)	Pin Pin!~	Shua Shua~	Byu Byu~
Standing Still(停止)	Ryoshu Ryoshu~	Shoa Shoa~	Rion Rion~

(! : means the sound rapidly fade out)

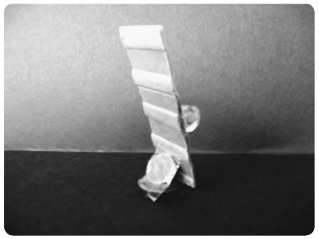
Mr. Suzuki used miniatures 3D models with students that were using the Sonic Guide. He made diorama sets with miniature trees, poles, fences and cars which represented the real environment. The student would then compare the miniature set with the real world using the Sonic Guide. Students could better understand sound signals' implications about various objects in the area.

Communication pole



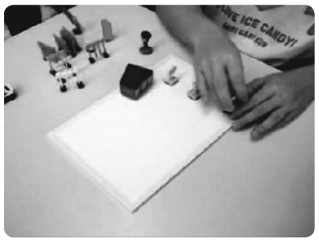


Overpass stairway





Building mini village

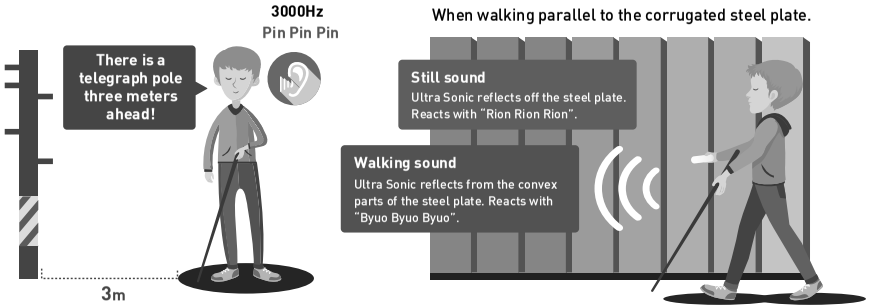




In one case, a student had lost his vision during middle school. He practiced walking using the Sonic Guide and diorama sets. Later, when he got used to the technology and gained meaning of sound signals, he could draw the shape of the road with tactile pen by listening to sounds from the Sonic Guide.

3. Technology Using Ultra Sonic Waves: K-Sonar

Mr. Suzuki gained more expertise in teaching blind students using another tecnology, K-Sonar. This was basically a more developed version of the Sonic Guide. Students could have a greater awareness of various environments by using this device. Many teachers of the blind in Hokkaido noticed its effectiveness and followed suit. They engaged students in activities by practicing a combination of using the K-Sona and 3D miniatures.



As instructors taught the sounds that came from the machine, students were more engaged, while listening to the change in tone as various objects translated into unique signals. Eventually, they became more curious about general sounds even while they were not using assistive devices. They started trying to notice small changes in sounds and echoes that came form their cane, traffic, walls and fences. That was the most important thing that teachers intended from the start: understanding one's surroundings and knowing one's position in the environment.

2. READ BY HANDS

In 1970, Mr. Suzuki started teaching in Hokkaido at Sapporo Blind School. He learned that students in vocational training classes who were studying acupuncture, moxibustion, and massage, would receive a national license for their own business after graduation. Mr. Suzuki noticed that learners did not use braille textbooks, even though they offered many that contained relevant professional knowledge. As a result, most students studied using a cassette player that had recordings of the teachers' voice from class. The blind students felt they had to study in their dormitory rooms. They didn't want to bother others in class with the sounds coming from the cassette player. Mr. Suzuki wondered why students did not study using the braille textbooks.

1. Why Students Did Not Like to Read Braille

The reality was, it was easier to write in braille, but reading braille was an extremely difficult and slow process, even after plenty of practice. So, people who accidentally lost vision later in life acknowledged that learning and studying with braille textbooks was almost impossible. However, Mr. Suzuki doubted that.



Reading Braille Book

In 1966, Mr. Seo Masao, a teacher at the blind school in Tokyo, taught braille to 4 children at elementary 1st grade. His lessons started in April. He tested students' progress in May, June, and July. He discovered that of the 46 Japanese braille symbols, students demonstrated various levels of difficulty; 17 letters were simple to learn, another 16 letters were of a 'medium' difficulty, and the last 13 were very difficult.

2. Grouping of Letters



Using these results, Mr. Suzuki categorized Japanese braille into 5 levels according to how difficult the letters were to learn. However, his method was a little different from Mr. Seo's categorization in that he took distictive features of each symbol into consideration. He started teaching level 1 letters, the easiest, to 3 students in vocational training classes. All of them had acquired visual impairments later in life. He taught them every day after supper because they stayed in the dormitory. (Table 1)

Table 1 SUZUKI's Grouping

No 1	A	Me	Re	Fu	U	I	Ni	Ku				
No 2	Ko	Ka	O	Yo	Hi	Nu	No	To	Na			
No 3	Ta	Sa	Shi	Mi	Wa	Mu	Ne	Mo	Tu			
No 4	Yu	Su	Wo	Ya	Ha	Ru	Ma	So	Ki			
No 5	He	Ke	Nn	Ho	Ra	Se	Ti	Ri	Ro	E	Te	

Later, he also taught braille to students in elementary and middle school, who were gradually losing sight and expected to lose it entirely in the coming years. While teaching them, he did periodic tests in which students had to read braille letters of a random sampling. He categorized braille letters into 5 groups based on these test results.

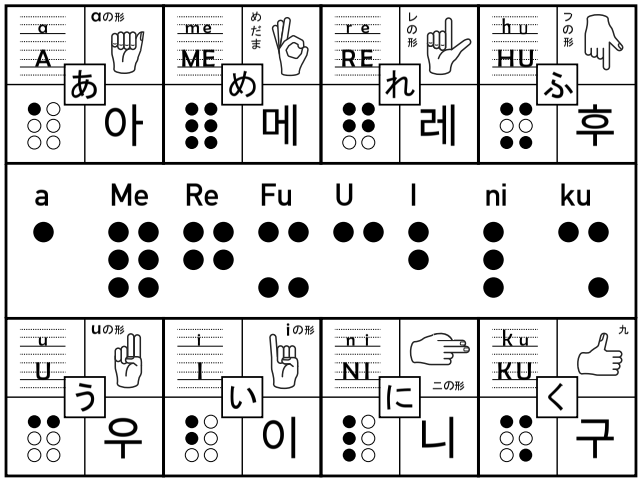
(http://onoderashingo-zaidan.or.jp/pdf/article/cont04/034.pdf).

Level 1 has あ(a) め(me) れ(re) ふ(hu) う(u) い(i) に(ni) く(ku). These are the easiest letters to read. They are simple and clearly distinguished when reading with left index finger. (Graphic1)





Graphic 1



Suzuki's method was proven to be very effective when he was teaching elementary 1st grade students. This is why it can be applied to even those who lost sight from diseases or accidents, as the most effective way to acquire fluency reading braille in the shortest period of time. The letters in level 1; あ(a) め(me) れ(re) ふ(hu) う(u) い(i) に(ni) く(ku), are usually mastered in 5 to 10 minutes if one carefully studies the shapes.

For example, あ(a) looks like a dot, め(me) is a block, れ(re) is a small block, ふ(hu) is a railway with empty space in-between, う(u) is a horizontal line, い(i) is a short vertical line, に(ni) is a long vertical line, and く(ku) is consists of three dots, which is just one more dot added to う (u). This is how students learned level 1 letters. They read the letters using their fingers while listening as the teacher reviews the shapes of each one.

3. Suzuki's Braille Education

Once they got used to the shape of each letter in level 1 group, it was time to try sentences made up of these letters.

Examples

Combination of letters	Meaning
1) あめ(a/me) あめ(a/me) ふれ(hu/re) ふれ(hu/re):	rain rain drops drops
2) あに(a/ni) めいに(me/i/ni) あいに(a/i/ni) いく(i/ku):	going to see brother and sister

Even those with acquired visual impairments could easily read the sentences shown above without consuming much time. It gave students a great sense of accomplishment when they successfully read sentences in braille. Reading in braille gave them hope and confidence for living this new life after losing their sight. The following is detailed information of Suzuki's braille reading guide. (table 2)

Table 2 Three Principles of Suzuki's Braille Education

1. Starting with the easiest letters

あ(a) め(me) れ(re) ふ(hu) う(u) い(i) に(ni) く(ku) are the easiest letters to read. Suzuki grouped Japanese braille symbols into 5 levels, from easiest to most complex. When a student mastered letters of a certain level, Suzuki added another letter, one by one, for slow and steady improvement.

He always thought about how to make learning braille a fun activity, so he came up with words and sentences that students could practice in each level. This improved their proficiency, and students became more interested in learning braille. Suzuki found positive praise as another effective way to encourage children. When students read braille correctly, he would not hesitate to say, 'Good!' 'Great!' 'You are doing awesome!'. It couldn't be said too many times and it surely kept students motivated.

2. Drills

Drilling is a very important part to enhance braille fluency. Teachers should cooperate with parents or dormitory staff to encourage students to review their classroom lessons after school. In this case, recording teachers' voice can be very effective. Students can replay the lesson from a recorder and practice at home or in the dormitory.

3. Individualized Teaching Plan

Students' abilities, reading habits and skills are different from each other. Teachers must plan individualized education for each student and practice with love and patience. To do that, the first thing is to understand student's current level of braille competency. A worksheet with random letters could be helpful to assess how well the student can read. Below is the worksheet Mr. Suzuki used in class. He instructed students to read the letters so that he could evaluate the student's current reading level.

は(ha) ぉお(o) う(u) つ(tsu) て(te) や(ya) さ(sa) ろ(ro) ま(ma) め(me) そ(so) し(si) の(no)
い(I) あ(a) ひ(hi) り(ri) れ(re) こ(ko) み(mi) と(to) ら(ra) ぬ(nu)

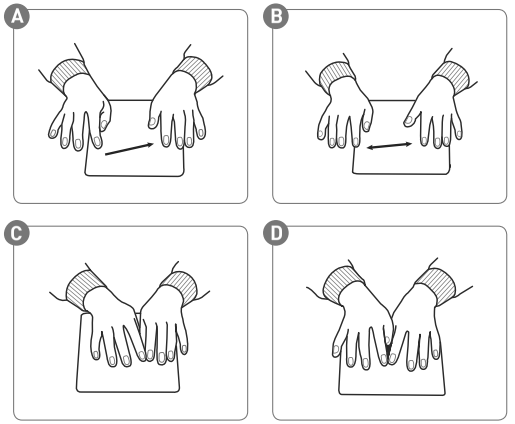
4. Importance of Correct Posture



orrect Posture

Meanwhile, it is very important part to ensure student sit up straight and hold the correct posture. The book should be located with centerline of the body. The level of desk should reach as high as elbows while reading, and the height of the chair must be adjusted until student's entire sole of the feet securely contact the floor.

5. Coordinated Reading Using Both Hands



Students should learn how to effectively use both hands to read braille. It will surprisingly speed up reading fluency as skills continue to build.

Coordinated reading by both hands

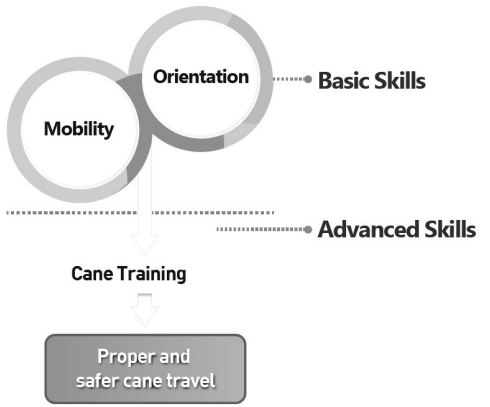
Moreover, learning Hiragana is highly recommended for blind children, too, because it will enhance their communication skills and understanding of their mother language. Mr. Suzuki and Mr. Fukuda teamed up to sort 46 Hiragana letters into 6 categories based on their structure. In other words, letters in the same group have more in common acording to their shape and form.

3. WALK BY HEAD

There are two primary ways to teach environmental orientation and mobility skills to children with visual impairments. First, students travel through a planned route. In this scenario, they already know the destination and the necessary clues to reach it. They locate the clues using a cane or their feet. When they find the last one, they know they are close to the destination. The second way is when students travel through an unfamiliar environment. They create a mental map by making connections between sensed information and clues on the path.

The former is for those who begin to learn basic skills in early stage or have limited intellectual abilities. As higher level students develop proficiency in these basic skills, teachers should set long-term goals that develop the ability to create mental maps, in various settings, and to walk to the destination, using as many methods and paths as possible.

Orientation and mobility are basic skills for children to master before having the ability to move independently. These factors were found after teaching many children about environmental clues and how to walk with cane. Children with higher orientation skills usually have better spatial understanding and awareness.

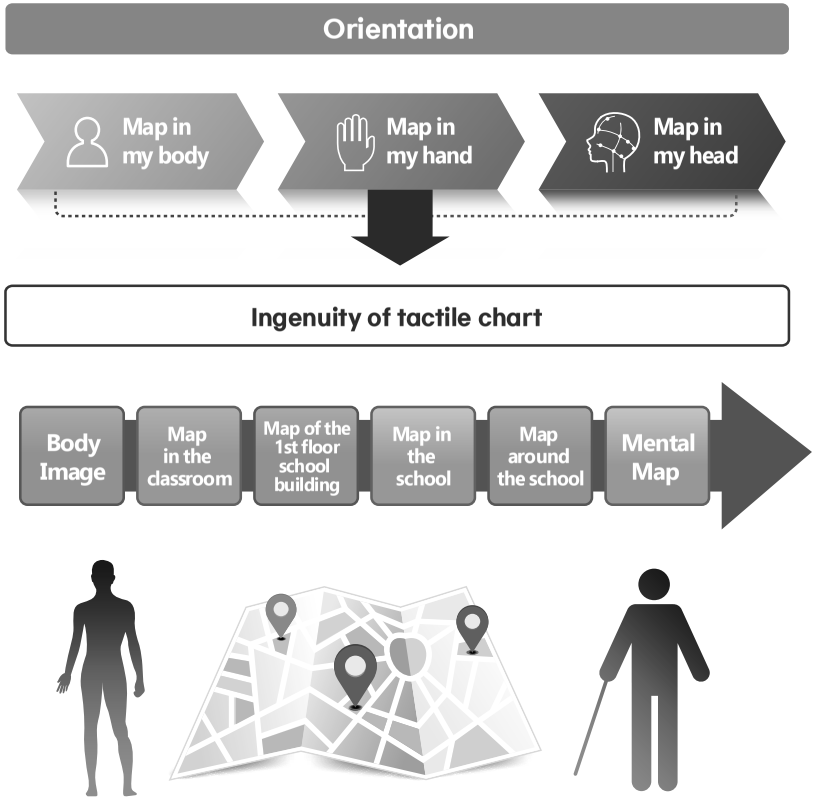


Coordinated factors to reach higher level of cane walking

Those with better mobility skills, even when they don't have high intelligence, can acquire sufficient abilities to "look by ears" because their mobility skills helps them find and understand things in various environments. With cane skills built on ample orientation and mobility, children can achieve proper and safe moving ability.

Therefore, to raise children's ability to move independently, educators, before everything else, should train them to "look by ears": understanding the environments with sounds, to "read by hand": reading braille with fingers and understanding things through touch, and to "walk by head", utilizing skills to create mind maps and navigate the environment.

Mr. Suzuki highlighted three steps to develop orientation skills for blind children: the 1st is understanding the body's map, 2nd is understanding the map in hands which means reading a braille map, 3rd is having a mind map.



He taught 12 subjects shown below to teach students, from kindergarten to high school, sufficient orientation and mobility skills

1. 12 Subjects for Advanced Orientation and Mobility Skills

❶	Body Image / basic understanding of body's structure
❷	Directions / Understanding on directions
❸	Detecting Sounds / Detecting the direction where sound comes from
❹	Sound trajectory / Sounds tracing
❺	Route trailing / Following decided route
❻	Orientation by the sun and wind / Getting clues from warmth of sun and winds
❼	Understanding familiar spaces / exploring familiar places
❽	Cane handling / basic skills
❾	Cane techniques / advanced skills
❿	Signs and letters on tactile map / basic understanding of tactile map
⓫	Walking with tactile map / practical use of tactile map
⓬	Walking on snow-covered area / Hokkaido is a snow country

Above all, it is very important to teach blind children according to their developmental phase. The following is a good example of teaching children about the use of mental-mapping.

2. Steps to Teach Mind Mapping

Step 1. Trajectory

Sound trajectory

a. Sound trajectory on empty space

b. Marking sound trajectory on paper or board as it is heard



Route trailing

a. Walking on trail

b. Walking in a certain direction felt on the map



Step 2. Understanding map

a. Map of school

b. Map of school and surrounding area



Step 3. Drawing maps

a. Map of school

b. Map of school and surrounding area

Step 4. Walking with map

a. Familiar place

b. Challenging new places

Step 5. Further Study on Tactile map

a. Shapes and signs

-Shapes on tactile maps

-Signs on tactile maps



b. Useful tactile figures that can be used to make tactile map

-Miniatures from the Ohwaki Intelligence Test Kit

-Miniatures from the Stanford-Kohs Tactile block Design Set



c. Planar fugure(three dimensional figure cut open and laid flat)

d. Reading tactile maps

-Camparing real place with tactile map

-Drawing with the Raise-writer

e. Making 3-dimensional set

-Using Science kit

-Using Plastic model

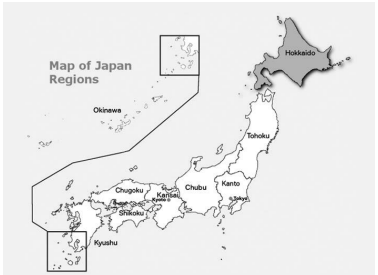
f. Learning general letters used by sighted people

3. Walking in Snow

Idea of snow tip and study over snow patten Snow country Hokkaido!



Snow Festival

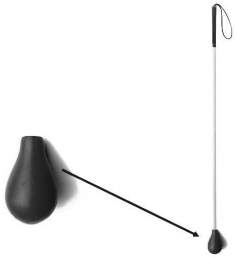


Hokkaido map

Hokkaido is the region that has the most snow in Japan. People live with snow a third of the year. It brought the need to teach blind students safe and effective ways to walk on snow.

❶ Introducing Snow Tip

Snow Tip for better detection during snowy season



when blind people would walk in the snow, their cane would not clearly detect snow because it is hard and sharp. Mr. Suzuki tried to attach various things on the tip for better detection, such as Ping-Pong ball, but still couldn't be sure of its usefulness. Eventually, he found that the rubber bulb from a baster was perfect to be used for a snow tip. For the Snow tip, cut the base of the rubber bulb to the thickness of a white cane and wear it on the tip of the white cane.

❷ Studying snow patterns

Mr. Suzuki took pictures of snow patterns on roads for 3 years. Then he analyzed pictures and sorted snow-covered roads into 3 patterns as shown below.

Pattern 1. Snow starting



Snow found on the shoulder of roads

Pattern 2. While Snowing



Snow piles on intersection, sidewalk, and around the curb

Pattern 3. Melting



Sidewalk is still frozen while roads are clear of snow

❸ Proposals for Walking in Snow

- Teachers should Help children to have positive feelings about snowy weather and lead active life style in snowy environment
- Blind schools in snowy countries should build up network for educational cooperation
- Students should get used to assistive technologies to better detect things under snow : the Sonicguide and the Tri Sensor are useful tools

4. AS CLOSING

My Answer to Education for Blind Students

Teaching students with visual impairments should be based on the same curriculum with their sighted peers, only methods and standards can be revised to help them achieve qualifications aimed by the curriculum.

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耳で見る　手で読む　頭で歩く

～盲児への指導～

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Look by Ear, Read by Hand, Walk by Head

– Education for Blind Children –

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盲児への指導は，視覚に障がいのない児童生徒に優るとも劣らないよう育てることである。そのため，「耳で見る」「手で読む」「頭で歩く」力を意図的・計画的に培う必要がある。

1．耳で見る：「耳で見る」とは，聴覚情報を活用して目で見るがごときに環境を把握することである。盲児は，自分の後ろ側にある目では見えない環境も聴覚情報で知ることができる。

2．手で読む：「手で読む」とは，点字や触図などを手指で触って，文意などを読み解くことである。盲児は，手指を通して得られる触覚情報を読み解くことができる。

3．頭で歩く：「頭で歩く」とは，今いる所から移動先までの地図を思い浮かべ，移動できることである。盲児は，知らない土地でも地図情報を聞き，白杖を使用して移動することができる。

盲児への指導は，視覚以外で得られる各種情報を効果的に活用し，視覚に障がいのない児童生徒と同じような概念形成ができるよう指導することが重要である。

（日本ロービジョン学会誌　19：29―35，2019）

キーワード：盲児，「耳で見る　手で読む　頭で歩く」，視覚障がい児，視覚障がい教育

Purpose：The goal of education for blind children is to nurture these children's abilities so that their performance is as good as or better than that of students without visual impairments.

Methods：We identified the following essential skills for blind children and taught them to teachers of blind children to help them intentionally and systematically cultivate these essential skills in their students：

1. Look by Ear：To "look by ear" means to grasp the environment solely using auditory information, in the way that sighted persons recognize things with their eyes. Because blind children understand the environment via auditory information, they can recognize what is happening behind them without turning around.

2. Read by Hand：To "read by hand" means to use the fingers to read Braille and feel objects so that the blind child can read and understand objects in the environment through the fingers.

3. Walk by Head：To "walk by head" means to build a map of the physical environment in one's head and use this mental map to follow the most effective route to the desired destination. Blind children can even determine and use a white cane to follow a reasonable route just by listening to an explanation of a map, even though they have never explored the area.

Results：Teachers who developed these skills themselves were able to teach them to blind children.

Conclusions：It is important that teachers of blind children learn to effectively use various kinds of non-visual information so that they can teach these skills to visually impaired children.

(J Jpn Soc Low-vision Research and Rehabilitation 19：29–35，2019)

Key Words : Blind Children, Look by Ear, Read by Hand, Walk by Head, Visual Disability, Education to Blind

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はじめに

盲児への指導は，視覚に障がいのない児童生徒に優るとも劣らないよう育てることである。そのため，「耳で見る」「手で読む」「頭で歩く」力を意図的・計画的に培う必要がある。

「耳で見る」とは，聴覚情報（以下　音情報）を活用して目で見るがごときに環境を把握することである。盲児は，自分の後ろ側にある目では見えない環境も耳で知ることができる。

「手で読む」とは，点字や触図などを手指で触って，文字情報やそろばん，図表などを読み解くことである。盲児は，見ることのできない重さや温度やきめ等も手で知ることができる。

「頭で歩く」とは，今いる所から移動先までの地図を思い浮かべ，確実に移動できることである。盲児は，知らない土地でも地図情報を聞き，白杖を使って移動することができる。

本稿は，これらについて，教育実践した内容等を整理したものである。

「耳で見る」

盲児を指導した者は，盲児の音情報に対するその感受性の高さに驚かされる。例えば，教師が聞くことのできない廊下を歩く足音で誰が来たのかがわかったり，歩道を歩いていても交通標識を支えるポールを正確に位置づけたりすることができる。

盲児に対する環境から発せられる聴覚情報は，直接的な音源から発せられる音情報と「やまびこ」のように反響された音情報に大きく分けることができる。

盲児が歩行しているときに活用する直接的な音情報の多くは，車のエンジン音やクラクションの音やタイヤと道路面が接触する際に生じる交通音，またはほかの人が歩く足音や，街頭や店内のスピーカーの音などである。反響された音としては，白杖のタッピングにより生じる音，歩く靴音が壁や塀などにぶつかって撥ね返ってくる音，あるいは道路を走る車の交通音が壁や塀などにぶつかって撥ね返ってくる音がある。また，街路樹や電柱，電話ボックスがあると車両の直接的な交通音が遮られて「陰になることによる遮閉効果」も，盲児と車の間に何かの物体があることを知らせてくれる音情報である。

盲児にこのような音情報をきめ細かく指導することにより，盲児を取り巻く環境を具体的な環境として指導することができる。

超音波を利用する Sonicguide は，環境物体までの距離をピッチ（1m の距離は 1KHz 音，2m の距離は 2KHz 音，5m の距離 5KHz 音までを確保）で，環境物体の表面素材を音色で提示することができる環境把握器である。Sonicguide は，ちょうど目で見る情報の虫眼鏡のように，盲児に対して環境物体の音情報をより鮮明にする働きをもっている。その音情報は，環境構成物に正面から正対したとき（静的状態の音情報）と，横を歩いているとき（動的状態の音情報）の組み合わせで，ある程度見分ける[1]ことができる（図 1）。

鈴木[2,3]は，Sonicguide を使用して盲児が歩いた環境の音情報を指導し，電柱や木の塀，コンクリート塀，ブロック塀，垣根，駐車している自家用車，街路樹などと認識できた環境物のミニチュアで，環境をジオラマとして再現させる指導を先天盲児らに行った（図 2）。

中学 2 年生時，両眼を失明（1962 年生）し，1979 年に Sonicguide を活用してジオラマを作ることを指導した高等部の中途失明児は，歩行環境を想起して「絵が描ける」と

	静的状態の擬声音						
動的状態の擬声音	区分	ピン ピン～	ピン ピン～	リョン リョン～	リョシュ リョシュ～	ショヤ ショヤ～	ジョヤ ジョヤ～
	ピンピン！～	標識ポール 街灯ポール	コンクリート 電柱				
	ジョアジョア～		トタン看板	モルタル塀 レンガ壁			
	ピンピン !!! ～		コンクリート塀 （つなぎ目有り）		金網フェンス ナイロンネット		
	ビュゥビュゥ～			ブロック塀			
	プォョプォョ !!! ～		工事用鋼板 防護壁				
	シュフィン シュフィン～			波型トタン塀	金属フォンス		
	ビュフビョフィ				アルミフェンス		
	シュアシュア～						多種樹木の生け垣

図 1　Sonicguide 音の静的擬声音と動的擬声音のマトリックス

いうので，環境を描写する指導[4]を行った。この中途失明児は，Sonicguideを活用して，歩道の真ん中を歩き，その環境を十分に観察し，Sonicguideで得た環境状況を，車で5分程度の距離にある学校に戻り，カナタイプで状況を記録するとともにレーズライターで次の絵を描いた（図3）。

鈴木は，Sonicguideの後継機として製造されたK-Sonar[5]を用いて，盲児の空間概念を発達させる教材と位置付け，北海道内の5盲学校でK-Sonarに熟知した教師が遊びを通



左図ミニチュアの説明

Figure 1. Examples of attachment

A-the surface of the road made of asphalt; B-the surface of the road made of ground; C-the surface of the road made of grass; D-concrete; E-blocks; F-wood; G-bedge; H-stone; I-board like waves; J-snow; K-continuous poles; L-wire netting; M-a small building; N-a big building; O-an electric pole＝street-lamp; P- a street tree; Q-a gate; R-a car; S-a telephone box; T-a vending machine; U-a garden plant.

図2　歩行環境のミニチュア例

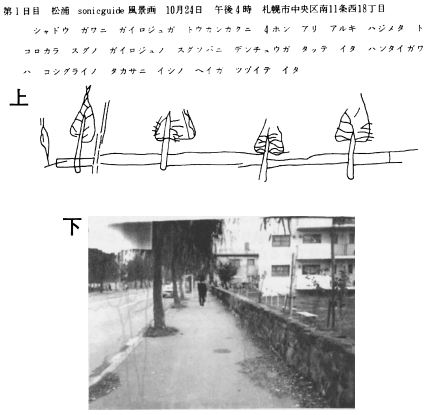


図3　中途失明盲児が観察した環境状況の文章と描いた環境絵図（上），実際の環境写真（下）

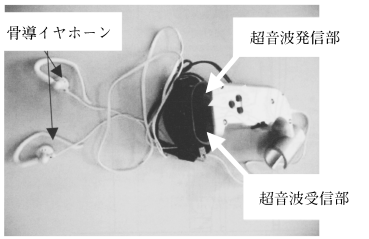


図4　K-Sonarの外観

した指導[3]としてジオラマ構成を試みた（図4，5）。

盲児には超音波を活用した環境把握器でその音色の変化を意図的・計画的に指導することにより，音への興味関心が高まり，K-Sonarなどの環境把握器がなくても，盲児自身がもっている音情報への感受性を強めて，歩いている足音や白杖の反響音，交通音の反響音などを活用して，歩行環境にある塀や生垣，各種構造物などの環境構成物体を見分ける（聞き分ける）ことができるよう指導することが何よりも大事なことといえる。つまり，「耳で見る」とは，このような歩行環境にある反響音等を上手に活用し，自分と環境との関係を正しく想起することができることである。

「手で読む」

1970年，鈴木は北海道札幌盲学校中学部に奉職した。そのとき疑問に思ったことの一つとして，学校の教員や建築現場で働いていた人たちが病気や事故で失明し，高等部専攻科理療科に入学して鍼，灸，マッサージなどの免許を取得するため勉強していたが，その多くは点字の教科書を使わずにテープレコーダーに各授業の教師の声を吹き込んで寄宿舎の自室で聞き返していたことである。盲学校なのになぜ点字教科書を使用しないのだろうか。その理由はすぐにわかった。点字は，点字盤を使用して打字することは，点字構成の理屈を知っている誰でも可能であるが，打字した点字を指で触読することは大変に難しいことだったのである。当然，点字教科書も触読することができなかったのである。

鈴木は，瀬尾政雄氏[6]が，1966年に東京教育大学付属盲学校小学部1年生4名の担任として，入学後の4月から点字触読を指導し，清音46文字の習得状況を5月，6月，7

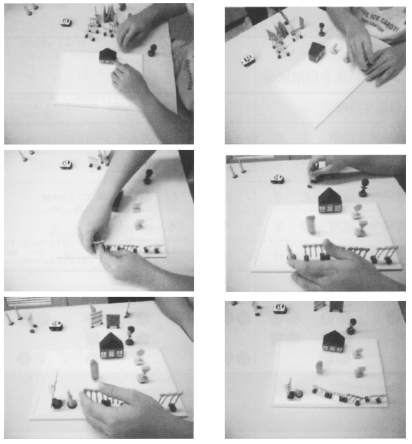


図5　環境構成ミニチュアとジオラマ構成事例[4]

月各3回の触読調査をし，その結果を「易17字　普16字　難13字」に難易度別に3段階に整理した。1972年，その3段階難易度別に区分した点字を踏まえて，点字の形態をも勘案して，次の4群の難易度点字で触読指導を行うこととし，高等部専攻科3名の中途失明者を寄宿舎で夕食後，中学部校舎で点字触読の指導を行った（表1）。

その後，小学部および中学部の失明が予想される児童生徒4名に点字触読指導を行い，その指導中の無意味つづり字による習得評価[7]を整理して，次の難易度5段階区分とした（表2）。

鈴木は，この点字触読指導に係る難易度5段階区分での指導と，指導原則「易から難への原則」「ドリルの原則」「個別化の原則」の3原則による指導の概要を「鈴木式点字触読指導法」として公表（https：//onoderashingo-zaidan.or.jp/pdf/article/cont04/034.pdf）している。

例えば，第1段階に区分した「あ　め　れ　ふ　う　い　に　く」は，点字のなかでも容易に左手の人差し指の「腹」で触るとその違いを認識することができる点字である（図6）。

本指導法を発想した点字配列は，小学部1年生の実態を踏まえたものであることから，盲児への点字触読指導は無論のこと，とくに，事故や病気で中途失明した人たちにとっても，短期間で点字触読が可能になる実態がみられる[7－9]。

表1　難易度4段階区分　※（　）内の文字は相似形の点字群

難易度段階	区分した点字群
難易度1段階	あ　め　れ　ふ　う　い　に　く
難易度2段階	（こ　た）　か　（は　ぬ）　お　（さ　よ）
難易度3段階	（そ　ち）（せ　み　も　て）（へ　む）（な　や）ゆ（ら　り　ろ　ん　え　る）
難易度4段階	（す　ね）（き　の）（と　し）（け　つ　ほ　ま）わ　を

表2　難易度5段階区分

難易度段階	区分した点字群
難易度1段階	あ　め　れ　ふ　う　い　に　く
難易度2段階	こ　か　お　よ　ひ　ぬ　の　と　な
難易度3段階	た　さ　し　み　わ　む　ね　も　つ
難易度4段階	ゆ　す　を　や　は　る　ま　そ　き
難易度5段階	へ　け　ん　ほ　ら　せ　ち　り　ろ　え　て

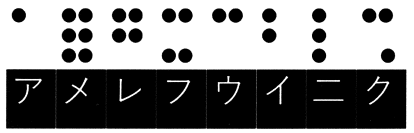


図6　難易度第1段階に区分した点字群

この第1段階に配列した「あ　め　れ　ふ　う　い　に　く」は，普通であれば，5分間から10分間程度で，各文字の特徴（「アは，一つの点」「メは，大きな塊」「レは，小さな塊」「フは，レールと同じ上と下に線，中が空いている」「ウは，横の線」「イは，縦の短い線」「ニは，縦の長い線」「クは，ウの右下に点」）を諳んじて，触覚を通してその形状を認識することができ，それぞれを特有の文字として触読が可能になる。また，この第1段階の点字を使って，「あめ　あめ　ふれ　ふれ」や，「あに　めいに　あいに　いく」などの短文を作り，その意味を読み取ることができれば，中途失明者は失明の失望が喜びに，不安は期待へとその気持ちを切り変えることができるようになる。なお，鈴木式点字触読指導の3原則は，表3のとおりである。

表3　鈴木式点字触読指導の三原則

1．易から難への原則

「アメレフウイニク」のように，鈴木が区分した難易度別5段階の点字群を参考にするなどして，触弁別し易い点字から，点字指導を導入する。また，触読可能になった点字を，常に，基盤として，新たな点字を，1字毎，混ぜて単語を作ったり，短文を作ったりして，楽しく指導する工夫が大事である。また，点字を指で触読出来たら，「よく読めたね」「素晴らしい」「いいぞ」など，盲児等を肯定的に受け入れつつ，点字を触読出来たことを「誉めて，誉めて，誉めて」，盲児等のモチベーションを常に高く保つことも重要である。

2．ドリルの原則

点字触読指導は，通学している場合は家庭との連携指導，寄宿舎生の場合は寄宿舎指導員との連携指導を図り，毎日，学校での指導と同じ内容を繰り返し学習できるよう，触読学習のシートと同じ内容の入ったレコーダ等の音声機器を活用し，繰り返し，繰り返し，ドリルできるよう教材を工夫することが重要である。

3．個別化の原則

一人の教師が複数の盲児等を指導する場合，一人ひとりの盲児等の能力・触読の特性等，学びのスピードは，個々，個別的であることから，一人ひとりに対して，愛情深く，かつ粘り強く点字指導することが重要である。このためにも，必ず，触読できる点字状況等を把握するため，

「無意味つづり」字等で触読することができる点字の評価を行うことが求められる。鈴木は，次に配列して「無意味つづり」を評価表として使用した。

は，お，る，つ，て，や，さ，ろ，ま，ぬ，そ，し，え，の，い，あ，ひ，り，れ，こ，み，と，た，ら，ふ，め，ほ，わ，な，ん，よ，け，む，ゆ，す，に，を，　ね，せ，う，も，き，へ，く，か，ち，だ，び，が，じ，ず，べ，ぐ，ぜ，ど，ば，ご，ざ，ぶ，ぎ，づ，で，ぼ，げ，ぞ，ぱ，ぴ，ぺ，ぷ，きゃ，にゅ，ちょ

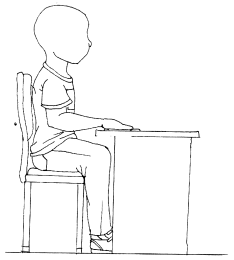
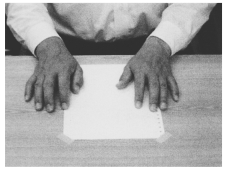


図7　点字触読時の正しいひじの高さと足裏の状況

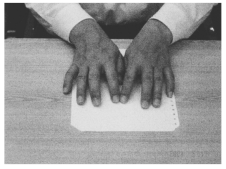
また，点字触読の指導においては，体に正中線をぶれることなく固定するため，机に正対するとともに，机の高さはひじの高さとし，足裏全体が床につくよう椅子の高さを調節するなど，常に正しい姿勢で点字を触読するよう働きかけることが重要である（図7）。

また，点字の触読は，触読時に左右の手指を分担する「両手読み」を指導すると，触読速度を飛躍的に高めることができる（図8）。

更に，盲児には，「ひらがな」を指導することも重要である。この指導は，そんなにも困難なことではない。鈴木と岡田吉生氏は，1973年，「ひらがな」46音をひらがなの形に着目して，次の6カテゴリーに分けて盲児に指導した（図9）。

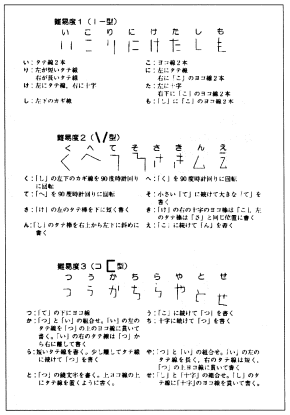

1．行のはじめを左手で読む


2．右手を左手につけ，読み続ける


3．右手で読み続け，左手は次行に移行する


4．右手が行の最終を読むと，引き続き左手で次行の最初から読み続ける。右手を左手につける

図8　両手読みの左右の手指の分担移動



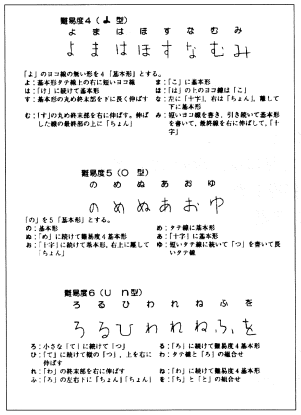


図9　盲児へのひらがな指導の難易度別配置とその指導法

「頭で歩く」

盲児が歩行するための方略は，大きく二つに分けることができる。一つは目的地までに至るすべての手掛かり（ランドマーク）を一連の連なりとして記憶して，その記憶に基づいて白杖や足裏などで確認しつつ移動する歩行と，自身の身体軸の向きと環境の手掛かりとを弾力的に「頭の中の地図（「メンタルマップ」）」に位置付けて移動する「頭で歩く」歩行である。初期的指導として，また知的にも遅れている盲児への指導として，前者の指導は考えられるが，多くの盲児には「頭の中の地図」を構成し，身体軸が変化してもそれに応じて「頭の中の地図」を回転することができる能力（「オリエンテーション能力」）を高めるよう工夫して指導することが重要である。鈴木[10]は，盲児の歩行を次の概念図で整理した（図10）。

歩行における基礎能力を「オリエンテーション能力（広い空間を把握することができる力）」と「運動能力（自身の周りの空間を把握することができる力）」としたのは，多くの盲児を指導した体験からの発想である。「オリエンテーション能力」が高い盲児は空間構成力が優れた盲児，「知的に優れた盲児」といえるし，「運動能力」が高い盲児は例え知的に優れていなくても，その活発さから「耳で環境を見る」力を得ていると考えられる。この「オリエンテーション能力」と「運動能力」の輻湊的な力を盲児の歩行を形作る基礎能力と考えることができる。この基礎能力に合理的な白杖の操作能力を身に付けさせることにより，初めて盲児は安全で，かつ確実な目的的歩行が可能になると考えている。

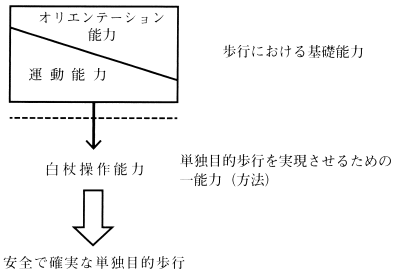


図10　盲児の歩行概念図

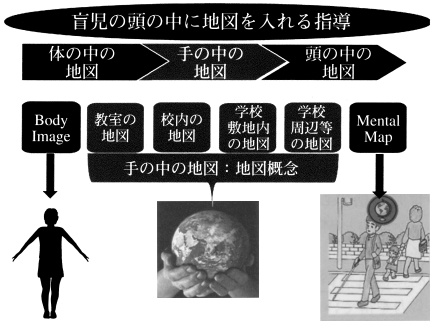


図11　「体の中の地図」→「手の中の地図」→「頭の中の地図」の概念図

したがって，盲児の歩行能力を高めるためには，本稿前述の「耳で見る」力を養い環境構成物の把握する力を高めるとともに，また「手で読む」力を活用した「オリエンテーション能力」を高める指導を工夫し，「頭で歩く」力を高めることが重要になる。

鈴木は，オリエンテーション能力を高める指導として，発達段階的に「体の中の地図」→「手の中の地図」→「頭の中の地図」と段階的な指導が必要と考えている（図11）。

幼稚部から高等部の盲児には，次の12の要素[10]で幼稚部から高等部の生徒を指導した。

1．ボディーイメージ要素
2．方向概念要素
3．対音源歩行要素
4．音源軌跡要素
5．歩行軌跡要素
6．対風，対太陽に対しての身体の方向づけ要素
7．空間構成物の関係把握要素
8．白杖探索要素
9．白杖操作要素

表4　「頭で歩く」ための地図指導

内容1　軌跡とは何かを教える
①　静的軌跡（盲児自身を中心としたときの刺激の軌跡）
ア 水平面における音源の軌跡　　イ 音源軌跡の標識化
②　動的軌跡（ある地点を基準とした時の盲児自身の歩行軌跡）
ア 狭小空間における歩行軌跡
イ 狭小空間における方向を中心とした読図
内容2　地図とはどんなものかを考える
①　直線的位置関係にある出発地点一目的地点の地図構成⇔読図
②　校舎内の配置構成⇔読図
③　学校内の配置構成⇔読図
内容3　空間構成物を標識化することを教える
①　学校周辺の構成⇔読図
②　学校近辺の構成⇔読図
内容4　地図を使うことを教える
①　歩行経験のある地域の読図歩行
②　歩行指導している地域の地図作成
内容5　点図の読み取りを諸作業を通して教える
①　点図の触読
ア 点図と厚みのある平面物との対応
イ 点図の触読によるペグボード構成
②　図形構成
ア 大脇式知能検査器具
イ スタンフォード・コオ式ブロックデザインテスト
③　立体と展開図
④　触覚的点図の理解
ア 実物との対応
イ レーズライターへの転写
⑤　立体構成
ア ストリップアッセンブリー
イ プラモデル
⑥　普通文字の書き，読み

表5　雪道歩行研究私論

1　雪国の盲学校の課題として
1年の三分の一を雪とともに生活しなければならない北海道だけでなく，雪国といわれる本州の盲学校においても，児童生徒がその土地で生活できる安全な雪道歩行の知識と技術をいかに身に付けさせるかが課題となっている。
2　スノーチップの開発と雪道パタンの抽出
鈴木は，安全な雪道の歩行を児童生徒に確保させる目的で，次の2点について研究した。
(1) スノーチップの開発
軟らかい雪の中に，白杖がズブズブ突き刺さらないようなアタッチメントを開発するため，石付にプラスチックボールやピンポン球など色々な物を付けてみた。その結果，理科の実験で使うゴムスポイトが，雪道路面条の情報を的確に捕らえることがわかった。
(2) 雪道パターンの抽出
3年間にわたり，同じ場所の雪道を継時的に写真で記録し，それに基づいて降雪時期を3期に分けた。
○降雪初期
太陽熱や車の交通によって，アスファルトなどの路面が出るが，道路の両端にはシャーベット状の雪が残る。
○本格的降雪期
歩行者が通り抜けるための出入り口をもつ交差点パタンや，車道と歩道を隔てる道路パタンなど特有のパタンを呈する。
○融雪期
凍結した歩行路面と，アスファルトが露出した車道の組み合わせが基本になる。
3　雪道歩行をより安全にするための今後の課題
(1) 雪を克服し，逞しく生きる意欲や態度の育成
(2) 雪国の盲学校の相互連携による指導プログラムの確立
(3) 吹雪や大雪の後でも，確実に環境が把握できる電子機器（日本ライトハウスのソニックガイド，横浜訓盲院のトライセンサー等）の手軽な入手など

10. 歩行標識と点地図作成要素
11. 読図歩行要素
12. 雪路白杖操作要素

とくに，「頭で歩く」ための地図指導[11]として，発達段階的に次の概略で指導した（表4）。

北海道は，年間の1/3は雪があるので，雪路を安全に歩行できるように指導[12]しなければならない。鈴木は，点字毎日に次の情報を提供[13]した（表5）。

おわりに

盲児教育とは，視覚に障がいのない児童生徒と同じ指導内容を盲児が理解し，活用することができるよう指導することである。

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Comment

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Winter Traveling in Hokkaido Land Japan

Sigeo Suzuki

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Fushimi, 4 Chome, Sapporo, Japan.

Translated by Hitoshi Shintani

Hokkaido, the second largest island in Japan, is located in the far north of the islands: at 45 degrees latitude, and 138 degrees longitude, it is covered with snow for six months of the year, from November to April.

As a trainer for winter traveling for 10 years in this area, I have developed some systems which may be of interest in similar climates.

1. Attachment for white canes: to prevent the tip of the cane from penetrating snow, I invented several attachements which enable the blind person to walk easily, even swiftly, through the snow. These attachments will not penetrate the snow; can slide on the slow; and can be taken off and put on easily.

No. 1 and No. 2 cane (Figure 1) came in 1971. But it was made of plastic and was too slippery. In 1972, I cut the end of the "spuit" made of rubber and put it into the tip of the cane, developing Number 3 and 4. These have proven very resistant to the snow.

2. Classification of snowy roads by progress of the season:

a. Early stage (end of November to the beginning of December): From 10 cm. to 15 cm. of snow during the night melts within the next day. More than 20 to 30 cm. of snow requires several days to melt. Different classifications apply to parts of the road for cars and parts for pedestrians; a sidewalk is always classified as a clear path (Figure 2).

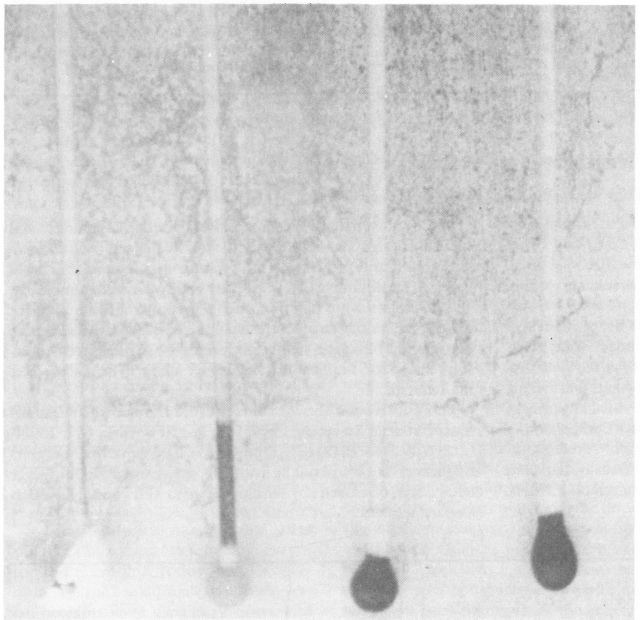


Figure 1. Cane tips modified to cope with winter conditions. The plastic tips found on the two canes on the left were too slippery for winter use. The two canes on the right were modified with the addition of rubber tips.



Figure 2. Sidewalks, designated as "clear paths" in Hokkaido, are usually kept somewhat clear of snow.

b. Middle stage (mid-December to mid-March: In this period, I divided the snow roads into five groups:

(1) crossing: from a wide road to a wide road,

(2) a crossing: from a wide road to a narrow road (Figure 3),

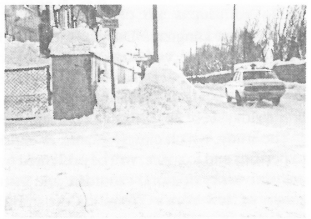


Figure 3. An example of a street intersection where a wide road becomes a narrow road.

(3) a crossing: from a small road to a small road,

(4) intersection of a wide street (Figure 4), and

(5) intersection of a narrow street.

Knowing the type of crossing one faces helps determine the technique —and sometimes the route.

c. Late stage (end of March to the end of April): The surface of the road is exposed except for mountains of frozen snow (Figure 5), icy-hard and dangerously slippery. Snow which on a sunny day might melt into sherbet now freezes at night. Gradually this snow melts, the surface of the road can begin to be scraped by the cane's spike, and dirt mountains piled at the side of the road replace the frozen ones.

3. Classification of snowy roads by time of day:

a. New-snow stage (from midnight to six o'clock in the morning): existing snow is hard and well-trod; new snow covers it only lightly.

b. Treaded snow stage (from 6 in the morning to the noon): as the road is narrow, passable portions may change as snow is removed.

c. Stable snow stage (from noon to . . .): roads revert to the first stage pattern.



Figure 4. A wide street intersection of a type of often encountered in Hokkaido.



Figure 5. During April, much snow has melted exposing road surfaces, yet many mountains of cleared icy snow still must be navigated.

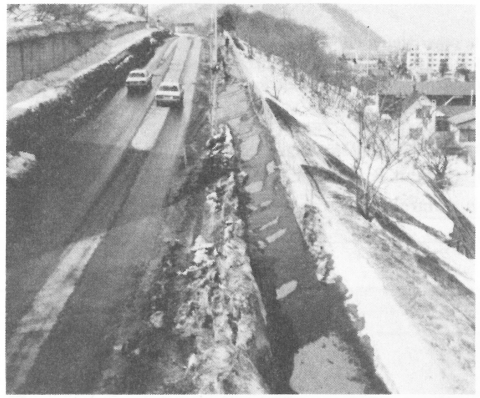


Figure 6. In March, much snow has melted on the sunny side of the road.



Figure 7. By May, snow has almost completely melted, and the road's lines are redefined.

4. Changes in the roads between December and May:

a. December: snowfall of 30 cm.,

b. January: snowfall of 100 cm.,

c. February: snow sometimes melts and the sides of the road turn black,

d. March: snow melts on the sunny side of the road (Figure 6),

e. April: snow is completely gone from the sunny side and is starting to melt on the other side, and

f. May: snow is gone; redefine the lines of the road (Figure 7).

5. Cane techniques for traveling on snowy roads: it is necessary to master "slide technique" and "guide technique," and to use "diagonal technique" roads.

When walking at the edge of the road using the "guide cane technique," they must angle the cane upward by 20 or 30 cm. to the sides of buildings. This keeps the sense of direction constant, and prevents walking into the road in a snow storm.

6. Training for winter traveling:

a. By using pictures made of thermoform, trainers can instruct trainees on the characteristics of the previous winter;

b. Trainees check the outside environment themselves against the pattern of the thermo-form.

Cane and street-crossing techniques are taught only after basic picture of the environment has been built up for each student.

7. Training with the Sonic–Guide™ for snowy roads:

a. Use of summer landmarks

b. Use an environment which is similar to the inside of a building (Figure 8)

c. Use a crossing road whose entrance is clear.

8. Inside the city center and inside buildings: Trainees must take off the rubber attachment to the cane (Figure 9)—



Figure 8. When training with a Sonic–Guide™, the use of an environment similar to the wide expanses found in the inside of buildings, such as large cleared snow areas, is recommended.



Figure 9. As the climate warms, trainees may often find it useful to remove the rubber tip from the cane to navigate inside buildings, on cleared sidewalks, and so on.

this means carrying a waterproof bag.

These are the ways I train my students to travel safely for six months of every year in Hokkaido land Japan. I would like to hear from readers in other winter climates about special adaptations and techniques they have discovered.

Shigeo Suzuki is a gymnastic teacher at Hokkaido High School for the Blind, Sapporo, Japan. The translator, Hitoshi Shintani, teaches English at the school.

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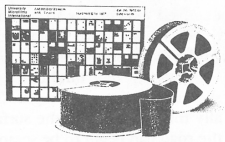
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Evaluating Methods for Teaching Orientation and Mobility with Sonicguide

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Abstract: Sonicguide (S.G.) serves the function of "an eye" for blind persons. To make most effective use of the Sonicguide, trainers must evaluate training methods. This report introduces one way of evaluating training with S.G., through the handling of miniatures and of schematic drawings.

The Function of S.G. for the Blind

Persons who are using S.G. can be divided into two groups: early, congenitally blind persons and later, adventiously blinded persons. The type and level of their impairment requires different training methods.

Using S.G., newly blind persons must learn to make their visual images correspond to their experience when they could see. On the other hand, congenitally and early blind persons must first grasp spatial concepts, and get a sense of when they actually are. My aim in training blind persons with S.G. is to enable them to grasp their environment where they have to walk.

When I teach newly blind persons how to grasp their environment, I must evaluate them according to how much information they understand, and therefore how to deal with them. Early and congenitally blind persons must grasp spatial concepts by means of information acquired by S.G.

The Evaluation of Dealing with Information Provided by S.G.

There are five basic ways to evaluate how to teach blind persons to deal with information provided by S.G.

1. Trainer observation of how the user behaves in his/her environment.
2. Trainee oral reports on their environment to their trainers.
3. Trainee written impression of the environment.
4. Trainee expression of visual images by making miniatures to show spatial concepts via S.G.
5. Trainee expression of visual images by schematic drawings.

I would like to discuss the 4th and 5th ways indicated above.

(1) *Dealing with environmental information by the making of miniatures.* The excellent point of making miniatures is that trainees can show their environment where they have walked. With magnets attached to the bottom, these miniatures can be easily put on, taken off, or rearranged on an iron board. The most useful miniatures are:

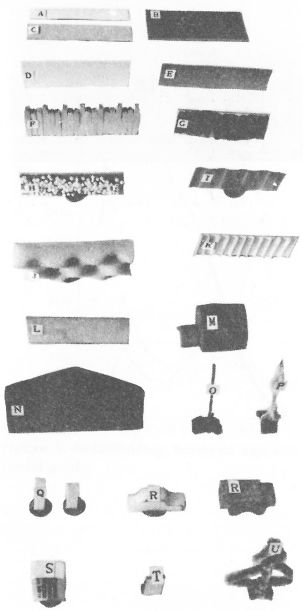
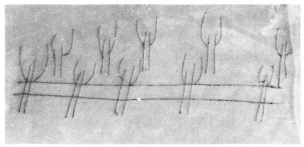
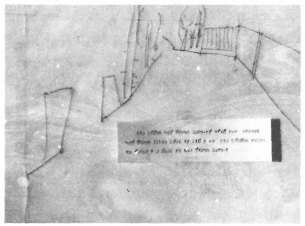
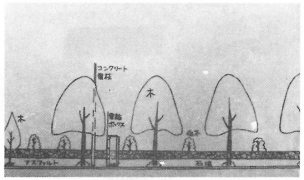


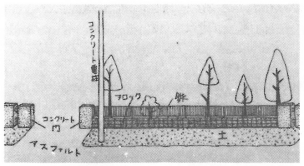
Figure 1. Examples of attachment
A-the surface of the road made of asphalt; B-the surface of the road made of ground; C-the surface of the road made of grass; D-concrete; E-blocks; F-wood; G-hedge; H-stone; I-board like waves; J-snow; K-continuous poles; L-wire netting; M-a small building; N-a big building; O-an electric pole = street-lamp; P- a street tree; Q-a gate; R-a car; S-a telephone box; T-a vending machine; U-a garden plant.

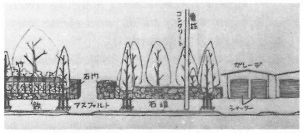
Figures 2–6











Trainees can make a miniature through information provided by S.G. For example, by carrying an iron board, if they perceive the presence of a telephone box via S.G., they can put a miniature of a telephone box on the iron board.

(2) *Dealing with environmental information by the making of schematic drawings.* This method is excellent for newly blind persons, and congenital, early blind persons who can draw. Figures 2-6 represent pictures drawn by a blind man born in 1961, who lost his sight in September, 1975. To have his picture be most effective for him, he should follow these guidelines:

- Be alert to his controlled environment via S.G.;
- Eliminate information other than that provided via S.G;
- Draw his picture of the images acquired by S.G. with raised writer. Trainers should not give suggestions, but allow the trainee to draw a picture of his own images;
- Finally, he should compose sentences based upon his picture.

Conclusion

S.G. may truly function as "an eye" for blind persons. Newly, adventitously blind persons have many visual images from their experience of seeing in the past. S.G. can help give them meaningful words, by these images once they learn to associate with S.G. signals. They can then truly "see" their environment by understanding these words.

For early, congenitally blind persons, S.G. is a more ambiguous "eye," because the ability to discriminate images is not as clearly understood. By matching S.G. signals with schematic images; I think, however, that even totally blind persons can learn to "see" by making visual images with S.G.

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