

Kit 2:

Our Senses

Guide Dog Discovery Centre
Curriculum Worksheets



Teacher's Guide to Kit 2: Senses & Signals

This kit of resources focuses on the main human senses and how they relate to a sensory disability like blindness.

In this guide:

- Key Messages & Learnings for This Module
- Quick Overview of the Provided Activities
- Other Suggested Learning Activities
- Background Reference Information
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- Curriculum and Outcomes Information

Key Messages & Learnings for this module:

1. Humans' senses enable us to interact with the world we live in.
2. In some cases we use our senses separately but in many ways we use them together. Living without one or more of our senses poses many challenges for learning, for communicating and for safe, independent living.
3. Most humans tend to rely more on sight than on their other senses.
4. Sound and touch can be very important sense for people living with blindness. Learning to make more use of sound information can help people who are blind or vision impaired to interact with others, understand their world, get around and stay safe (NB the sense of touch is covered in more detail in Module 5).

Food for Thought: The Impact of Losing Sight

For most people, sight is not only their major sense but also their main way of thinking about the world. For sighted people, two thirds of conscious attention is usually taken up with analysing and interpreting what we see and two thirds of what we remember is dominated by visual information. This means that the brains of sighted people tend to rely more on vision than all the other senses but, of course, in reality it's not quite that simple because sight is also linked with how we develop and use our other senses, too.

For people who are blind or vision impaired, life without sight can be very difficult. There are a great many logistical challenges to living in a sighted world. The question of how to get around safely is an important example. Orientation and Mobility Instructors can provide training to help people who are blind or vision impaired learn how to move around their home, their community (and, if they want, the rest of the world!) safely. But for most people living without vision, logistical issues are not the most difficult thing.

Some people with low vision or blindness can become isolated, lonely, sad and even depressed. Listening and letting them know that someone cares and can help is the most important part of the job of social workers who work with people who are vision impaired.

In this context it is not hard to understand why being able to make the most use of other senses, like hearing, is enormously important for those who have little or no vision.

Quick Overview of the Provided Activities

2.1 Signal Spotting

This activity focuses on building awareness of the role that vision plays in communication and other forms of interpreting and interacting with the world. It has two parts – a straightforward and relatively brief class worksheet and a longer homework part (which asks the students to watch TV so is set to be the most popular homework you will set all year!). The entire activity can easily be set as homework.

2.2 Writing, not sighting

In this activity, students write their name on a worksheet and then try to do it again blindfolded (or with their eyes shut). The difference in handwriting shows just how much visual feedback matters in guiding even the most common and well learnt of actions including those using other senses (in this case, touch).

2.3 Taste Tester

A teacher-directed activity that does not require a student worksheet and is designed to explore both the interconnections between our senses and experimental design. Groups use themselves as test subjects exploring how well they can guess a food type without vision and by taste alone, by smell alone and by taste without smell. A teacher guidesheet is provided.

2.4 A Sixth Sense?

This is a high-energy and fun activity which is not recommended to use just before you need a quiet or subdued class! The only special requirements are a few cushions. The activity introduces the notion of proprioception (the brain's constant awareness of its own position and orientation in space) and it is designed to enable students to explore the interconnectedness of our senses and our dependence on receiving information from our environment.

2.5 Sound Mapping

This worksheet is designed to be completed in small groups of 2-3 conducting a systematic survey of the sounds evident on their school campus. You can use this activity in either one or two parts. The first part asks students to list all the sounds they observe and the second, optional, part encourages understanding of sound (as opposed to vision) as a navigation and spatial awareness tool by asking students to map these sounds on a simple grid.

2.6 Listen Up

This is a group activity for teams of 8-12 students. It aims to introduce the concept of echolocation as part of the sense of hearing. Each group will need a chair, a blindfold and an area of floor space (it can also be done outside if the ambient noise is not too distracting).

Other Suggested Learning Activities

Cook things like rice, pasta or mashed potato with food colouring (try purple, green and blue for maximum yuck factor). Blindfolded students typically don't notice any taste difference while eyes-open students often imagine a taste difference that is not there. Another good activity is to flavour a cube of cooked potato with lemon juice and ask a blindfolded student to taste it. Without visual clues, most students will be confused between the texture of the potato and the aroma and taste of the lemon.

As many as 25% of women and 15% of men are thought to be 'supertasters' – people with heightened sensitivity to taste (although parents will be glad to know that this is not necessarily linked to being a fussy eater, supertasters can find strongly flavoured foods such as olives less appealing than the rest of us). Challenge your students to develop an experiment to discover if there are any supertasters in your class (or perhaps on staff!) HINT: Different concentrations of flavoured water could be a good way to start.

Investigate visual illusions with your class. There is plenty of information online and this can be a good way of introducing the notion that vision is not definitive; that different animals – and indeed different humans – see differently sometimes. And even when we do agree on what we see, we are not necessarily right!

Investigate colour vision with the help of paint chips from a hardware store. In recent decades scientists have proven that we judge colour by comparing something to other colours around it. A certain colour will look blue when next to green, for example, but green when next to other shades of blue.

Challenge your students to write a newspaper report about the discovery of a hypothetical new type of animal that has a sense that humans don't have (such as the ability to detect electric fields or the ability to see infrared light). For the really imaginative, they could write about a sense that no animal on Earth has yet been found to have!

Playground Practice

A fun way to get students thinking about the link between eyesight and proprioception is to ask a volunteer student to hold their arms out with their wrists crossed and their palms together then to interlock their fingers and fold their arms in towards their bodies. Then, with the class watching, point to each of their fingers (without touching) and ask them to wiggle it as quickly as they can. Seeing their hands and fingers back to front usually confuses people at first and it can take a little while to get the hang of it. Touching the finger to be moved makes it much easier because you are no longer relying on the sense of sight alone. (This is sure to be tried in the playground at recess!)

Useful Websites

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|---------------------------|--|
| Sensory systems | www.bbc.co.uk/science/humanbody/body/interactives/senseschallenge/ www.bbc.co.uk/science/humanbody/body/factfiles/sight/ |
| Perception and illusions: | http://faculty.washington.edu/chudler/eyeper.html http://www.exploratorium.edu/snacks/iconperception.html http://pbskids.org/zoom/activities/do/thaumtropes.html http://pbskids.org/zoom/activities/phenom/afterimage.html http://pbskids.org/zoom/activities/sci/peripheralvision.html http://library.thinkquest.org/J002330/opill.htm |

Background Reference Material

How many senses?

The idea that humans only have 5 senses goes back to Aristotle. These days, scientists recognize at least 12. As well as sight, hearing, touch, taste and smell we also have *nociception* (pain), *equilibrioception* (balance), *proprioception* and *kinesthesia* (joint motion and acceleration), sense of time, *thermoception* (temperature differences), and some people even have a weak *magnetoception* sense (direction).

Hearing

The ear has the body's smallest muscle and its smallest bones. The loudest noises we can hear can be one million times louder than the quietest. Very loud sounds (louder than 175 decibels) can kill someone.

Having ears on either side of our heads is very important. One ear typically hears a sound 1/1500th of a second sooner than the other ear. Doesn't sound like much but, combined with the sound being slightly louder in the close ear, it can be enough for our brains to tell very accurately where a sound is coming from.

Tasting & Smelling

Taste and smell are the body's main "chemical" senses. Scientifically speaking, taste is called *gustation* and smell is called *olfaction*. The tongue detects at least four types of tastes using different types of taste buds each for a different taste molecule but our noses are much more accurate and detect many hundreds. If someone cannot taste anything we say they have *ageusia* and if someone cannot smell we say they have *anosmia*.

Echolocation

Echolocation is a sense used by animals such as moths, bats and dolphins to find their way around, find prey or even to communicate. Some people who are blind can develop a form of echolocation which can help them get around safely. Like other skills, some people find it quite easy to learn, for some it takes lots of practice, while for others it can be almost impossible to learn.

In general, someone would create a sound, such as by tapping a cane or making a clicking noise with their fingers or tongue, then listen carefully for the sound reflected back from objects. With practice (lots of it) someone trained in echolocation can find obstacles and spaces between them to help them move safely around their environment. Even at its best, human echolocation is nowhere near as accurate as the ability of bats or dolphins.

Colour

Most of the people referred to as 'colour blind' can actually see some colours but not the full range seen by most other humans. This means they can't tell the difference between colours that other people can tell apart easily. There are many types of colour blindness but the most common forms affect the ability to distinguish between reds and greens. This is typically caused by a genetic condition and affects males more than females (in fact as much as 6% of the male population!).

Some animals can see colours that humans can't. For example, bees and some birds can see ultraviolet light while some snakes can see infrared!

Relevant Extracts from the Western Australian Curriculum Framework
Learning Areas and Outcomes information for this kit

| | | |
|--------------------|--|---|
| Science | INVESTIGATING | <ul style="list-style-type: none"> Students investigate to answer questions about the natural and technological world using reflection and analysis to prepare a plan; to collect process and interpret data; to communicate conclusions; and to evaluate their plan, procedures and findings. |
| Science | LIFE & LIVING | <ul style="list-style-type: none"> Students understand their own biology and that of other living things, and recognise the interdependence of life. Students understand the relationship between structure and function in living things and use that as a basis for understanding life-maintaining processes. They identify the characteristics of living and non-living things. They recognise themselves as living things and give examples of their needs and the characteristics that identify them as living. Students describe how living things function as whole organisms and explain the relationship between structure and function in systems, organs, tissues and cell. They know about the effects of disease and how to maintain a healthy lifestyle. |
| Society & Environ. | INVESTIGATION, COMMUNICATION & PARTICIPATION | <ul style="list-style-type: none"> Students investigate the ways in which people interact with each other and with their environments in order to make informed decisions. |
| Mathematics | WORKING MATHEMATICALLY | <ul style="list-style-type: none"> Students call on a repertoire of general problem solving techniques, appropriate technology and personal and collaborative management strategies when working mathematically. Students draw on a range of general strategies when dealing with mathematical problems to which they have no readily available method of solution. Students identify and attempt subtasks; generate and systematically list possibilities; and eliminate possibilities. They make thoughtful use of technology to enhance their mathematical work. But they also recognise the value of working with others, cooperating to pool ideas and welcoming, and dealing constructively with, conflicting perspectives and views. |
| Mathematics | MEASUREMENT | <ul style="list-style-type: none"> Students make sensible direct and indirect estimates of quantities and are alert to the reasonableness of measurements and results Students have a good idea of the size of common standard units, make sensible estimates with them, and have the disposition and skills to judge the reasonableness of estimates and measurements. Students also reason from known and collected quantities to estimate quantities which cannot be found directly or conveniently. |

Signal Spotting

Our eyes, eyebrows, mouths, foreheads, hands, arms and legs, facial expressions and body posture all help us to communicate.

Look at the pictures below. There are no words but we can still tell a lot about how each person is feeling. Write the feeling below each picture then create your own examples in the blank spaces.

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|  <p>.....</p> |  <p>.....</p> |  <p>.....</p> |
|  <p>.....</p> |  <p>.....</p> |  <p>.....</p> |



People who are blind or vision impaired can miss out on a lot of information.

If you are talking to someone who is blind it is important to remember to not send signals that the other person cannot receive.

Signal Spotting TV Homework (yes, really!)

Try watching 10 minutes of TV with the sound turned all the way down and then another 10 minutes with your eyes shut.

If you can, try this with something you have not watched before and with something that you have watched several times and know well.

What do you notice with the sound turned down?

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What do you notice with your eyes shut?

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Challenge Task

Choose a 10 minute section of a favourite movie or TV show and write a description of all the non-sound signals so that someone who is blind could understand what is happening.



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Write without sight

Ever heard an adult say 'watch what you are doing'?
Well let's put that to the test.

What to do

Write your name and address in the space below.

Now do it again a few more times but blindfolded or with your eyes shut.
(Don't peek. It's worth trying this!)

Homework: Do try this at home

Give family members a blank sheet of paper and ask them to try this.



Even something you have had lots of practice at can suddenly be difficult if you cannot see what you are doing. Writing blindfolded is a good example. Your brain relies on watching your writing – even when you are writing things you know well. Without being able to see how it is doing, your brain can quickly find it hard to be neat.

So we all have to 'watch what we are doing' and people who are blind have to do it without eyesight.

Taste Tester

Teacher-directed activity

Tasting Stations

Before Class

Set up three stations, each with the same selection of foods. You can choose the foods according to what is convenient but they need to have distinct smells. Three identical bags of fruit-flavoured lollies can work well, as can chunks of different kinds of fruit or slices of bread spread with different types of fruit jam. Chocolate, mints, licorice, strawberries, melon, bananas, orange juice, lemon, lime, vanilla, Milo and sausages are all usually quite aromatic for students. The main thing is that each group has the same foods, each with a distinct smell. It's worth doing a dry run on your friends, colleagues or family first to make sure that the food you have chosen gives clear results.

During Class

- Divide your class into 3 groups, each with a captain to record the results.
- The first group tastes the foods with their eyes closed.
- The second group tastes with their both their eyes closed and noses shut.
- The captain of each group records how often their group members guess the flavour correctly.
- If you have time, rotate the groups through each station. If not, just get the captain of each to report to the whole class and discuss observations.

What should happen?

In most cases, people find it much harder to guess taste correctly if they don't have the sense of smell. This is why food often seems to have lost its taste when your nose is blocked by a cold or hayfever.

A Sixth Sense?

What to do

1. Stand with bare feet on a level floor.
 2. Now stand on a cushion, then still on the cushion but on one leg.
 4. Try these again with your arms either outstretched or hanging by your sides.
 5. Repeat steps 1-3 wearing a blindfold or with your eyes tightly shut.
- Give a score out of 10 for each trial (1 = the easiest and 10 = the most difficult)

| Legs and Eyes | Trials | Score |
|-------------------|----------------------------|-------|
| 2 legs, eyes open | Feet on floor, arms out | |
| | Feet on floor, arms down | |
| | Feet on cushion, arms out | |
| | Feet on cushion, arms down | |
| 1 leg, eyes open | Foot on floor, arms out | |
| | Foot on floor, arms down | |
| | Foot on cushion, arms out | |
| | Foot on cushion, arms down | |
| 2 legs, eyes shut | Feet on floor, arms out | |
| | Feet on floor, arms down | |
| | Feet on cushion, arms out | |
| | Feet on cushion, arms down | |
| 1 leg, eyes shut | Foot on floor, arms out | |
| | Foot on floor, arms down | |
| | Foot on cushion, arms out | |
| | Foot on cushion, arms down | |

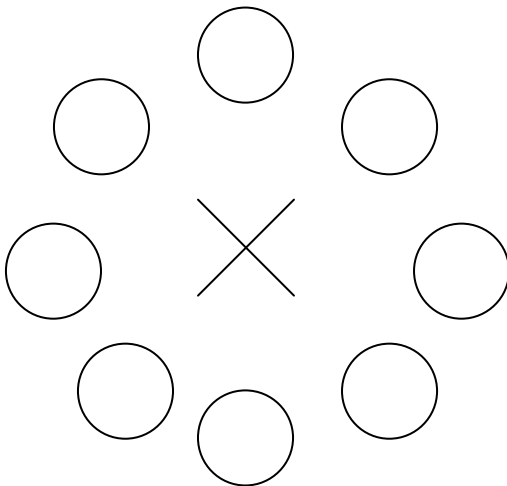
Proprioception (pro-pree-oh-sep-shun) is how your body keeps track of where it is. It is a sort of combined sense that pulls together information from lots of different sources to help your brain keep your body safe and balanced.

People who are blind need to use proprioception without visual information.

Listen Up

What to do

1. One blindfolded person sits in the middle of a circle.
2. Everyone else (except your captain) sits in the circle with one directly in front and one behind (see the diagram below).
3. At random and silently, the captain chooses someone to click their fingers. The person in the chair tries to guess where the sound comes from.
4. Repeat until everyone has clicked at least 3 times.
5. The captain can use a circle or a diagram like this one to record correct guesses.



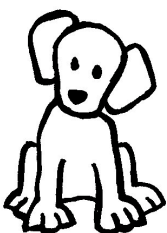
*If you have time,
take turns sitting
in the chair.*

For which parts of the circle is it easiest to guess correctly?

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Why do you think humans have two ears?

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Our sense of hearing doesn't just tell us how loud or what kind of noise we are hearing, it can also tell us where the sound is coming from. This is very important information.