

# TAVS



## The Test of Auditory and Visual Skills: Improving opportunities for screening auditory and visual processing

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The Test of Auditory and Visual Skills (TAVS) is a versatile screening tool developed to assess a range of fundamental auditory and visual skills. These basic skills are well understood to be vital for the higher level development of phonological awareness, speech, reading, memory and attention. TAVS assesses many of the underpinning sensory skills necessary to learn to read, speak, listen and concentrate.

### **Overview**

In the UK, as with other countries, reading at primary age level and access to the curriculum with strong reading skills at secondary age level is vital. The UK Government Department for Education statistics<sup>i</sup> show that 15% of children leave primary school at age 11 without the necessary reading skills to succeed. These results remain largely unchanged from previous years. 6% of these pupils have a reading age at least 4 years below their chronological age.

Many children who struggle academically are offered catch up phonics, literacy and numeracy programs without considering that the delays in learning may be more fundamental in nature than a simple lack of experience and practice. Underpinning the ability to read, listen, concentrate and communicate is the ability to take in and process auditory and visual information.

The testing of areas such as temporal processing, pitch perception, gap detection and others are vital to understanding at what level a child is delayed. This information can guide a teacher or therapist to know exactly what level of intervention or remediation is needed to ensure the quickest progress for the child.

TAVS offers a powerful way to assess many areas of low level visual and auditory processing to know whether sensory processing is impaired and if it is suitable to solely focus an intervention upon more cognitive levels of function.

### **Why screen auditory and visual processing skills?**

Children who find reading a challenge have been shown to have difficulties with a variety of basic sensory processing skills. These include pitch perception<sup>ii</sup>, auditory temporal processing<sup>iii</sup>, gap detection<sup>iv</sup>, duration pattern<sup>v</sup> and others. These are fundamental auditory processing skills for reading development as well as listening and concentration.

In terms of visual processing skills, visual temporal order<sup>vi</sup> and visual fusion thresholds<sup>vii</sup> are highly correlated with literacy, language and listening development.

It is clear then that auditory and visual processing challenges are an important area to consider for anyone working with children with literacy and concentration problems. If children do have these fundamental challenges with the processing of visual and auditory information, extra reading, phonics or other programs can have a limited effect.

Auditory and visual processing is often a component of labels such as dyslexia<sup>viii</sup>, ADHD<sup>ix</sup> and many others. Assessment of these areas is therefore an important part of a full understanding of processing capabilities at a sensory level.

Research<sup>x</sup> has also been conducted monitoring the way that sound is processed in the brainstem. This is below our conscious awareness and yet is crucial to how well higher parts of the brain receive an auditory signal. Three groups were used, 'good' readers, 'average' readers and 'poor' readers. There were clear differences in how well the brainstem represented changes in sound known as formant transitions in the three groups. The "poor readers had more variable brainstem responses to speech than did good readers". This was evident in changes from the consonant to the vowel sound in language. You can imagine the impact upon listening and reading skills if it is difficult at times to differentiate between 'bad' and 'dad' or 'cat' and 'sat'. These differences in processing are not down to fatigue over time but seem to be due to the delayed responses and variability in processing that can be evident in poor readers.

This type of evidence shows the links between differences in fundamental auditory processing abilities and reading. The auditory brainstem responses discussed above are dependent upon good synchronicity in the brain and the simultaneous firing of neurons. The fact that this is not well trained in poor readers will not only affect reading ability but also directed attention and other skills such as listening in background noise. Good readers have a stable representation of sound in the brain; poor readers do not. It is vital to understand, be able to screen, and take account of this when considering what programs are needed to help progression.

TAVS is able to screen many basic areas of auditory and visual processing to give this information.

### **Screening options and their importance**

The Test of Auditory and Visual Skills has a range of screening options available. A quick screening of important areas such as temporal order, fusion, motor skills, pitch discrimination and tone duration can be completed in around 20 minutes. To understand the importance of TAVS for your work it is useful to examine the areas covered in the quick screening option.

An initial pre-test is offered to make sure that anyone undertaking the screening is able to fully respond and understand what is required.

The pre-test consists of white noise which contains gaps. Within the gap may be a tone or silence. You are required to respond with a button press when a gap contains a tone but make no response when it is silent. This important test highlights children who are impulsive or unable to attend to the testing method as well as those who are not likely to be able to take this type of screening test as they do not understand what is required.

To explain a little more about the value of the TAVS screening we will focus upon one part; the auditory quick screening option:

This option assesses function in the following areas

1. Auditory Temporal Order
2. Auditory Fusion Threshold
3. Auditory Motor Skills
4. Pitch Discrimination
5. Pitch Pattern Tone Duration

### **Auditory Temporal Order**

Temporal order processing is the ability to sequence sounds that are presented quickly with only milliseconds between the sounds. Headphones are used to deliver sound in the ears in either a left to right or right to left pattern and the child is required to indicate where the first sound was; either in the left or right ear.

Temporal order has been shown to have close links to reading ability, speech and phonological awareness<sup>xi</sup>.

TAVS allows for the gap between the two sounds to be set at a suitable start level where the child can tell which sound comes first, the left or right. Each correct response will mean that the two sounds move closer together until the threshold point is reached. This is where it is very difficult to distinguish an order for the two sounds. At this point the sounds will move further apart again until the child can differentiate them. Then they will move closer again until the threshold is reached once more. Using this staircase method means that the threshold will be reached a number of times within the standard 3 minutes of the test. The result can then be referenced to the available norms to check whether it is within normal ranges.

This type of testing uses pure tones and is not language-based, meaning that it is assessing the basic auditory processing skill of temporal order processing without engaging language skills.

## **Auditory Fusion Threshold**

Auditory fusion is a measure of temporal resolution and is the ability of the auditory system to follow rapid changes in the envelope of sound. Challenges with temporal resolution correlate with reading and language development difficulties. Keith<sup>xii</sup> discusses the importance of auditory fusion as one of the methods for assessing temporal processing disorders.

The auditory fusion threshold is measured in milliseconds and is found by presenting two tones with a very small gap between them. This is known as the interstimulus interval (ISI). Available norms indicate that by about 8 years of age the ISI should be around 8 msec. If the fusion threshold is much higher than this then it would indicate temporal processing issues. The 2 signals are being perceptually fused together and heard as one. The gap is not being detected at a small enough level leading to masking effects for speech and other sounds. This will have an impact upon listening and language abilities.

## **Auditory Motor Skills**

This checks our ability to perceive a steady beat and match the beat exactly by pressing the left and right buttons in synchrony. As we match the beat the tempo will gradually increase until we can no longer keep the beat. This is the threshold and as with many of tests, the beat will then slow down until we can keep the beat again. This allows for the threshold to be reached a number of times within the test.

Children and adults who have challenges with keeping to an external steady beat will often have difficulties in areas of literacy, language and phonological awareness. These are not explained by any motor difficulty. Thomson and Goswami<sup>xiii</sup> found that “Children who were particularly inconsistent in tapping to a particular rate showed the poorest literacy and phonological development. These data could not be explained by general motor dexterity.”

## **Pitch Discrimination**

The ability to be able to differentiate two tones and know that one is higher or lower than the other is an important factor in listening, language and phonological awareness. Research such as Loui<sup>xiv</sup> shows a positive correlation between pitch perception and phonological awareness. Foregard<sup>xv</sup> shows that good readers have good pitch discrimination and phonological awareness skills whereas poor readers find challenges with these basic skills of auditory processing.

Adults are usually able to tell the difference between pitches that are less than half a semitone apart and as with many basic skills, this ability develops in children to an adult level by around 7-9 years old.

In the pitch discrimination task you are presented with two tones and asked to respond to which is the higher tone, first or second.

### **Duration Pattern**

As with the above tests, duration pattern shows many links to areas of reading ability, listening and learning. Evidence suggests a specific neural mechanism sensitive to tone duration<sup>xvi</sup>.

This task requires the child or adult to listen to 3 tones of the same pitch and work out which is the longest. Research<sup>xvii</sup> shows that children who have reading disorders make many more errors in the identification of patterns in either the length or pitch of tones on this type of task compared to controls.

### **A wide range of testing options**

The options above describe the quick auditory screening available. TAVS has nine basic screening options available, with a range of auditory and visual choices. These can be accessed either as auditory or visual options only, or combined to assess how each sensory system is being used to support the other.

The wide range of options available means that anyone can pick up TAVS and use it immediately for screening a range of auditory and visual low level skills. It is designed and intended to be used by teachers and learning support staff in schools, speech and language therapists, occupational therapists as well as other specialists working with auditory and other sensory interventions. Someone skilled and knowledgeable in sensory processing can use TAVS to develop a deeper understanding of how the child or adult is using their visual and auditory systems to function on a daily basis.

TAVS can be used as a pre and post measure for auditory and visual interventions to measure outcomes where sensory processing challenges exist. As the areas tested are the underpinning skills for reading, listening and attention TAVS forms a vital part of testing children's ability in school.

TAVS is an individually administered test suitable for children and adults from 5 years old. As it uses tones and contains no speech, it is a powerful indicator of auditory and visual processing skills whatever the language of the person being tested.

## Conclusion

The Test of Auditory and Visual Skills does not diagnose dyslexia, ADHD or other labels. However, in screening an important range of auditory and visual skills known to be highly correlated with strong learning and listening areas, it is a powerful tool. Used in conjunction with other measures, it can provide information to support the use of auditory and other sensory interventions.

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