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A checklist of tactile learning strategies that supports Tactile Working Memory

Tactile Working Memory Scale; a Professional manual
– Supplementary material 2

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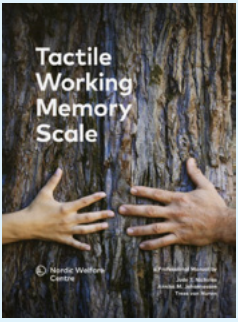

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Tactile Working Memory Scale
– A Professional Manual

The TWMS has been developed for professionals to facilitate identification and promote effective interventions of working memory in the bodily-tactile modality, especially for people with deafblindness. Cognitive processes responsible for encoding, maintaining and manipulating tactile information are key functions underpinning tactile working memory, a pivotal cognitive ability in humans. A bodily-tactile perspective is necessary to understand tactile working memory, especially for people with congenital deafblindness. The manual gives us an overview of the theoretical foundation and presents an assessment tool for identifying tactile working memory. Besides, the manual provides different examples of tactile learning strategies that can promote learning potentials, and support cognitive and language development in persons with deafblindness.

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The manual is assessable at Nordens Velferdssenter (NVC) https://nordicwelfare.org/en/publikationer/tactile-working-memory-scale-a-professional-manual/

In this overview of learning strategies, you will find examples of the strategies described in the Tactile Working Memory Scale (TWMS). These strategies can be divided into three groups:

- **Perceptual strategies**
- **Social cognitive strategies**
- **Cognitive strategies**

This overview will also include information on fundamental attention strategies, long-term working strategies, maintenance cognitive strategies and metacognitive strategies.

Within each group, there are examples of *general strategies* (G) and *item specific strategies* (I). The specific strategies are numbered based on the items in the TWMS.

General strategies are strategies that are necessary to optimize the physical and social environment within a bodily-tactile modality. Item specific strategies on the other hand, refer to TWMS item specific strategies that are facilitated within a bodily-tactile modality.

In this overview the ***bodily-tactile modality*** is understood as active touch and movement within the entire body. The bodily-tactile sensory system is based on an understanding of how various bodily-tactile sensations such as touch, pressure, vibration, temperature, pain, and proprioception (the position of one's own body parts) are processed through the somato-sensory system (Nicholas, 2021). Soma is the Greek word for "body", and the somatosensory system depicts that the entire body (e.g. head, mouth, nose, hands, fingers, legs, back and feet) is used to process various bodily-tactile sensory impressions. In other words, the somatosensory system is involved in receiving bodily-tactile sensory input, enabling us to systematically receive, select, interpret, categorize and store bodily tactile information (Gallace & Spence, 2009; Nicholas, Johannessen & van Nunen, 2019). Furthermore, the sensory function of touch/bodily-tactile sense which involves the various bodily-tactile sensations is crucial in providing information about our internal and external environments for social interaction and learning and it's essential for everything from active exploration to emotional bonding.

If you want to learn more about the bodily-tactile modality and learning processes read chapter 2 in the ***Tactile Working Memory Scale – A Professional Manual***.

An ***interaction partner*** means anyone who interacts with the person. This could mean parents, family, friends, next of kin and/or staff at home, in kindergarten, at school, at work, in daily activities etc.

Perceptual strategies are about promoting learning by systematically using touch and movement.

This could mean encouraging exploration of different objects with hands, feet or the whole body, or even feeling differences in shape and texture and allowing time to process, talk about and name what is experienced.

Social-cognitive strategies are about developing social interactions and communication within the bodily-tactile modality.

This can include creating a positive environment for interaction, using bodily-tactile movements to intentionally explore others and interact socially, using bodily -tactile cues in turn-taking and support expressions and understanding of emotions in a bodily-tactile manner within a social interaction.

Cognitive strategies focus on promoting attention and memory through various techniques provided within the bodily-tactile modality.

This can mean reducing distractions and support the person to stay focused on a task, as well as introducing and developing bodily-tactile memory strategies in different situations.

Perceptual strategies

Sensory strategies that reinforce bodily-tactile learning

Adapting the learning environment within a bodily-tactile modality

G

The interaction partner can provide opportunities for bodily-tactile, sensory-perceptual exploration and interacts with the person with deafblindness through a bodily-tactile manner by:

- engaging alongside the person in everyday tasks/activities that supports active touch and motion
- encouraging systematic exploration and creating unique experiences in a bodily-tactile manner
- providing possibilities for shared bodily-tactile exploration (i.e., examining an object of interest together)
- following the bodily-tactile initiatives of the person during tactile exploration
- allowing sufficient time for the person to process the ongoing information during bodily-tactile exploration (i.e., by waiting until the person is ready to proceed/continue)
- allowing sufficient time for the person to understand what is going on and to develop a response during bodily-tactile exploration (i.e., by pausing to give time to reflect and contribute; by anticipating a response and making room for the response to occur)

Supporting bodily-tactile perceptual strategies that have a focus on systematic scanning, identification of objects (similarities, differences, functions), localisation of objects and localisation of places

ITEM 1

The interaction partner, together with the person, jointly direct focus towards an object of interest in the immediate vicinity.

- Supporting the person to deliberately focus on the source of the bodily-tactile information or orient towards an object of interest (i.e., by leaning toward, grasping, or picking up a specific object together).

ITEM 2

The interaction partner and the person mutually explore and jointly detect the physical dimensions of an object in the immediate vicinity (tactual scanning of object structure).

- Guiding the person to feel the outlines of an object to estimate size.
- Support the person to hold firmly and lift an object to judge weight.
- Guiding the person to grip and hold an object tightly to judge large-scale/global shape.
- Guiding the person to trace contours and follow the edges of an object to judge fine detail/exact shape.
- Support the person to move from fine detail to large-scale shape to perceive parts to whole, and from whole to parts again.

The interaction partner and the person mutually explore and jointly detect the surface properties of an object in the immediate vicinity (tactual scanning of object surface and exploratory movement patterns).

- Guiding the person to distinguish between touching lightly (for details) and using firmer touch during object exploration.
- Support the person to gently touch or press an object's surface to detect vibration and pressure and to determine temperature.
- Guiding the person to firmly touch and use gross body movements (i.e., squeezing, bending, wrenching) to determine the flexibility of an object.
- Guiding the person to use lateral motions (i.e., rubbing, stroking) to detected dimensions of hardness/softness, smoothness/ roughness or bumpy/flat on tactual textures.
- Guiding the person to use right amount of force to determine proprioceptive feedback when pushing, pulling, or placing things.

ITEM 3

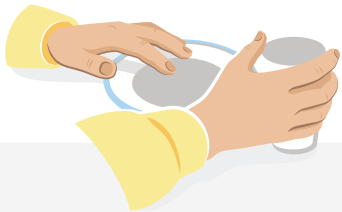
The interaction partner provides opportunities and supports the person to sequentially touch and compare things that are similar and contrast things that are different (tactual matching/differentiating).

- Guiding the person to tactually match similar shaped or textured objects (i.e., sorting materials based on their tactual similarities).
- Guiding the person to tactually discriminate between different shaped or textured objects (i.e., sorting materials based on their tactual differences).

ITEM 4

The interaction partner provides opportunities and supports the person to gather information about the function of an object in a bodily-tactile manner (object-function).

- Engaging the person to identify and recognize the functions of personal items/ objects and understand how to use an object as a tool (i.e., turning doorknobs, switching on/off light switches, using a bag to carry things, recognising tactile labels/tangible symbols, using simple tools (fork, spoon, hammer), using complex tools (kitchen mixer, computer mouse).



ITEM 5

The interaction partner provides opportunities and supports the person to gather information about the spatial placement of an object in the immediate vicinity (object-spatial location).

- Encouraging the person to use touch and body movements i.e. fingers/ arms or toes/feets to search for, reach and locate an object. For example, by supporting the person to use large body movements such as sweeping movements, stretching and reaching for an object.
- Guiding the person to tactually determine and recognize the spatial placement between objects. For example, provide support to identify the distance between a cup and the plate on the table or the distance between the table and chair.

ITEM 6

The interaction partner provides opportunities and supports the person to gather reliable information about a location in the surrounding environment (tactile-spatial navigation).

- Guide navigation in familiar spaces using touch to build body awareness (e.g. walls, stairs, entry/exit directions).
- Support tracing and navigating routes, including return paths, using physical guidance and tactile spatial mapping.
- Encourage use of landmarks and detection of obstacles through body-based (egocentric) cues.
- Support tactile estimation of distances between objects during navigation.

Social cognitive strategies

Strategies for managing demands to social cognition and improving social working memory skills

Establishing harmonious interactions and equal participation within the bodily-tactile modality

G

Create positive interactions and participation through bodily and tactile communication. The interaction partner pays attention to the person's bodily-tactile cues and encourages reciprocity and turn taking in social interactions.

- Pay attention to, confirms and reinforces the person's bodily-tactile expressions.
- Give the person enough time to adjust the intensity and flow of information during social interactions (processing time).
- Provide the opportunity for bodily-tactile turn-taking and allow enough time to start and maintain a turn-taking interaction.

Providing a scaffolding format within the bodily-tactile modality

G

The interaction partner offers social support through bodily – tactile communication.

- Structure routines and activities for social interactions so that the person can more easily understand the context and take their own initiative, as well as gain a better understanding of how the interaction is likely to develop.

Establishing a playful framework

G

The interaction partner engages the person in bodily and tactile play where improvisation can take place, routines are introduced and broken, and comical communication gaps can occur.

- Structure routines and activities for playful interaction, for example by using humorous activities and laughter to promote playfulness (repetitive actions that make others laugh) mischief (actions that violate common agreements) and incongruity humour (disrupting an established routine for comical effect).

Create realistic situations for learning with activities that are stimulating and meaningful

G

The interaction partner engages the person in outdoor activities that are meant to be experienced through bodily and tactile contact.

- Engage the person in meaningful outdoor activities.
- Provide a clear plan for an outdoor activity with a dynamic structure, which serves as a regular routine and prepares for transfers.
- Engage the person in an exploratory activity that includes important physical, tactile and spatial and relational aspects, such as climbing, where there are a clear start and end but also space for new and unexpected highlights, providing the opportunity for shared tactile exploration while providing a safe base.

Establishing multi-party contexts and conversational practices

G

The interaction partner engages the person in a bodily-tactile conversation with several people and gives the person the opportunity to perceive the others who are speaking and switch from one conversation partner to another.

- Establish bodily-tactile contact between the person and two or more interaction partners, where communication mainly takes place through movements, gestures and signs.
- Facilitate a bodily-tactile conversation with multiple people by inviting the person to place their hands in a listening position on the hands of other signing partners, enabling them to be included in the conversation.
- Encourage active participation by supporting the person to switch hand positions to signal turn-taking, allowing them to engage fully in the conversation.

Improving bodily-tactile communicational and language skills

G

The interaction partner ensures that the person can participate on equal terms by using different forms of bodily and tactile communication and/or linguistic strategies.

- Use hand-under-hand guidance and social haptic signs. Support the person in using tactile signs and tactile sign language to communicate with the body.

Fostering a sense of togetherness through the bodily-tactile modality

ITEM 8

The interaction partner provides many opportunities for social exploration.

- Let the person know that their partner is accessible, close and is there to provide emotional support.
- Become attuned to the person's emotions and mood in an engaged way, side by side.
- Provide plenty of opportunities for interaction and make it easy for the person to recognize you when close to each other.
- Coordinate interactions by switching gestures, movements, or characters in a smooth manner.

Supporting the person to detect the emotionally triggered bodily signals during on-body communication

ITEM 9

The interaction partner regulates the interaction to make it easier for person to be aware of the bodily-tactile social signals.

- Give the person enough time to perceive emotional body signals from the partner.
- Guide the person to become aware of their partner's feelings during close body contact, for example by showing how you express joy with your body, how you feel when you are angry.
- Support the person to become more aware of their own emotions during close body contact, for example by helping them understand how certain emotions feel in the body; by supporting them in identifying and expressing emotions through bodily-tactile communication.

Supporting social forms of attention (i.e., mutual attention, joint attention) in a bodily-tactile manner

ITEM 10

The interaction partner detects and follows the person's social forms of attention in a bodily-tactile manner, during social interactions.

- Give attention to each other or a joint activity by touching the same thing at the same time.
- Mirror/follow the person's movements in close bodily-tactile contact.
- Show that you are following what the person is paying attention to, for example by following their head movements or pointing.
- Support the person to pay attention to what someone else is doing.

Supporting the person to stay focused on the interaction for a prolonged time when a novel feature is introduced or when switching from one theme to another

ITEM 15 ITEM 16 ITEM 17

The interaction partner supports the person to sustain the flow of information, during the social interaction.

- Encourage the person to stay focused on the conversation for a longer period of time.
- Engage the person to actively participate in the ongoing conversation.
- Allow time for attention breaks if needed.
- Motivate the person to continue the conversation when a new topic or content comes up.
- Support the person to return to the conversation if the attention is drawn in another direction.
- Guide the person to switch focus from one topic to another during the conversation.
- Support the person in perceiving and understanding another's perspective or narrative.

Cognitive strategies

Mental strategies that involve attention, organization, retention, and deliberate manipulation of information to improve learning

General strategies

G

Provide support for thinking and learning through bodily and tactile methods. The interaction partner tries to understand what mental strategies the person needs based on their reactions and provides customized support to help with thinking and learning.

- Provide individually tailored support with thought and memory strategies.
- Support the person in gradually absorbing and using these thought and memory strategies on their own.
- Guide the person in using the thought and memory strategies in similar situations and in new learning challenges, even when they become more complex.

Fundamental attention strategies that enhance attentional skills

ITEM 12 ITEM 13 ITEM 14

Providing support to improve attentional skills, during bodily-tactile task/activity (fundamental attention strategies).

The interaction partner provides attentional resources, builds attentional skills, and accommodates for the person's struggles with attention.

- Remove distractions or reduce things that make it difficult to concentrate in a stressful learning situation.
- Encourage the person to stay focused longer during physical/tactile tasks or activities, for example by reminding them of the parts that give good results or that are fun.
- Support the person to understand where to focus by motivating them to keep their attention on the task or activity.
- Guide the person to understand what is not important to focus on and help them return to the task if the attention has been diverted.
- Guide the person to switch focus from one thing to another when needed during an activity.

Long-term working memory strategies: cognitive strategies for enhancing the link between working memory and long -term memory

ITEM 18

Categorization strategy – Organizing the information into distinct categories.

The interaction partner facilitates a categorization strategy by supporting the person to sequentially touch and classify things into categories.

- Support the person to feel and sort objects with different shapes or surfaces into groups (for example, dividing plants into groups that feel similar, such as plants with similar shapes).
- Support the person with guidance and encouragement to create new groups based on the feeling that things "belong together" (for example, bread is soft on the inside, and hard on the outside, but still the bread can be a loaf, whole grain or rye bread).

ITEM 18

Association strategy – Making associations by linking the new information to something that is already familiar or known.

The interaction partner mediates an association strategy by supporting the person to sequentially touch and associate the new information with things she/he already knows.

- Guide the person to recognize the connection between a familiar and a new object. For example, show how similar characteristics of a known object (such as a tree) can be linked to the characteristics of something new (such as a bush) and naming the different objects.

Chunking strategy – Dividing the information into chunks.

- Give the person a strategy where information is broken down into smaller, clear steps that are easy to follow. For example, by placing a sequence tactilely on the fingers.
- Example: Firstly (tap on the thumb) we feel the structures of the tree trunk with our fingers. Secondly (tap on the index finger) we use our body and hands to experience the height of the tree. Thirdly, (tap on the middle finger) we use our body and hands to experience the thickness of the tree trunk. Afterwards, you can recall the entire exploration by mediating; ”Firstly (pressure on the index finger) we felt the structure of the tree trunk, secondly (pressure on the middle finger) we experienced the height”, and so on.

ITEM 18

Retrieval cue strategy – Providing memory cues that help get access to long-term memory.

The interaction partner facilitates a retrieval cue strategy using the sense of touch by associating physical sensations with stored information.

- Give the person support by using bodily-tactile memory cues to strengthen memory recall to an experience, during activity or conversation. For example, bodily-tactile cues that refer to an experience stored in the long-term memory, like when the partner signs beach, the person tactual signs ocean. Or the person puts a hand to the other upper arm, squeezing the upper arm, the partner recognizes the expression as a trip to the doctor (measuring the blood pressure).
- The partner provides touch-based cues during a tactile activity to trigger memory associations; provide real-time tactile cues and tactile feedback such as presenting a previous negotiated bodily-tactile expression or tactile sign that both interaction partners are familiar with during conversation to improve specific contextual information about past experience.

ITEM 18

Narrative memory strategy – Creating a personal narrative to mentally integrate the “to be remembered” event/activity as a coherent whole.

The interaction partner mediates a narrative memory strategy by scaffolding the person to enhance the memory of a shared bodily-tactile event/activity through a narrative framework (autobiographical recalling).

- Create the opportunity for a joint bodily/tactile activity that is linked to a social situation.
- Support the person to construct and talk about the experience in a way that provides context, for example by describing what happened, when it happened and why it happened. An example would be saying ”we went together to the park to look at a sculpture” (theme); describe what happened first, then and last (time); and explain how one thing led to another (cause).
- Participate in a memory discussion with the person about the event, both during and immediately after the activity. For example, by helping the person remember details such as ”what did we do?”, ”who was there?” and ”where did it happen?”.
- Give the person the opportunity to talk about the experience through conversations about what happened, so that the person can reflect on the joint activity.
- Encourage the person to tell their version of the story of the event or activity.
- Share the story with others to help strengthen memory and provide more opportunities to talk about the shared experience.

ITEM 18

Method of loci strategy – Mentally engaging the "to be remembered" information to specific objects and locations along well-known spatial routes.

The interaction partner mediates a method of loci strategy that draws upon tactual mental navigation by helping the person to imagine walking a familiar path and assigning objects to various milestones/ locations along the way (tactile imagery).

- Support the person to walk through a familiar space, using touch to explore objects and their positions (e.g. table by the window, chair by the table).
- Reinforce object locations through repeated tactile cues during the walk.
- Support the person to mentally rehearse moving through the space and recalling object locations.
- Revisit the space, linking specific items to locations (e.g. apple on the table, banana on the chair).
- Repeat object–location pairings using bodily-tactile reinforcement.
- Encourage independent mental walkthroughs, "collecting" items from their locations.

Maintenance cognitive strategies: cognitive strategies that facilitate to keep information active within the moment

ITEM 19

Rehearsal strategy - Repeating the “to-be remembered” information in the same order that results in better memory recall.

The interaction partner mediates a tactile-spatial rehearsal strategy by repeating the “to-be remembered” bodily-tactile information in a purposeful and systematic manner (tactile spatial rehearsal strategy).

- Guide the person to repeat movement patterns or instructions in a clear and structured way during an activity, such as repeating a movement instruction, information about the location of an object, or a counting sequence with the body.
- Support the person in repeating movements or gestures with the same intensity and rhythm several times, for example by taking turns repeating a hand shape or gesture on each other’s bodies.

ITEM 19

Cognitive weeding strategy/error handling strategy – Corrective feedback following inattentive errors during learning situations to reduce cognitive overload.

The interaction partner mediates a cognitive weeding strategy/ error handling strategy to facilitate self-correction of errors in learning situations.

- Be aware that the person's mistakes were not intentional and provide help to correct the errors, so that the correct answers are given during the ongoing task or activity.
- Take into account that the errors were unintentional and provide help to correct them without disrupting the conversation or interaction when communicating tactilely. For example, correcting similar sign/tactile language errors and providing immediate, clear feedback by pausing and re-signing the correct term.

Metacognitive strategies: cognitive strategies for exercising attentional control and promoting self-directed learning

ITEM 20

Metacognitive conversation – Inviting the learner into a dialogue about what and how he/she thinks.

The interaction partner mediates a metacognitive conversation strategy which helps the person to think consciously about his/her learning and thinking processes.

- Engage the person in a conversation where they are helped to understand how to take on a bodily-tactile task step by step and reach the goal. For example, encourage the person to talk their way through the task and think about what they're going to do first, what's going to happen next, and what will happen when the task is done.
- Involve the person in a bodily-tactile multiparty conversation, switching between listening (receiving) and talking (signing) hands that involve fluid exchanges and alternate roles. For example, provide several opportunities for the person to communicate with two other interaction partners simultaneously, whilst switching hand positions and managing the pace to enhance interaction and increase self-awareness on one's own thoughts, behaviours and decision-making.

ITEM 20

Prospective memory strategy – Remembering to perform a planned/intended action at some future point in time.

The interaction partner mediates a prospective memory strategy in the bodily-tactile modality, that reminds the person to perform a planned action at a specific point in time.

- Engage the person in a conversation about future memories where they can practice reacting to a reminder or when they have completed a series of activities.
- For example, support the person to create ”if-then” plans:
  - “If you walk toward the site and feel the wall, and then come across a metal plate, remember to move the obstacle.”
  - “If you follow the handrail and reach the end, then you should remember to turn right.”
  - “If you’re in the car and feel your seatbelt, remember to put it on”.

This booklet provides an overview of learning strategies that help people with deafblindness to use their potentials in learning and development. The booklet is a supplement to TWMS – A Professional Manual. We hope you find the booklet useful and that it is helpful in your work to support cognitive functions in people with deafblindness.

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