

# The “Hidden” Sensory Systems of Sensory Integration: Tactile, Proprioceptive, and Vestibular

As children, we are taught to explore and pay attention to our senses of vision, hearing, smell and taste, but we generally do not learn about the sensory systems that are at the foundation of good sensory integration: our tactile, proprioceptive and vestibular senses. Occupational therapists trained in sensory integration interventions assess how the functioning of these three systems affect a person’s ability to receive sensory information from the environment, organize it, and respond appropriately.

The **tactile system** is one of the first systems that starts working in the womb. The ability to process information from touching and being touched is an early and important ability. It lets us identify what is safe or dangerous in the environment, providing a sense of security and self-confidence. The sense of touch also contributes to forming an accurate body image and the ability to relate to the environment spatially and then use that information conceptually (to form ideas) or motorically (to move our bodies). Touch helps build the “body maps” thought necessary for accurate praxis. This system also contributes to our ability to manipulate objects and complete tasks without “visual vigilance” (visual over-focusing, which is exhausting), for example buttoning a shirt, tying shoes or typing on a keyboard.

**Proprioception** is sensations from muscles and joints that tell the brain what each muscle and joint is doing. Kinesthesia develops from accurate proprioception, and is the (internal) knowledge of where each body part is and the direction in which it is moving. This system helps a person duplicate a body position when they have not watched the position being assumed, or imitate an action after demonstration – abilities used, for example, when pushing a pencil in the correct direction to form a shape or letter. Praxis is thought to develop from tactile and proprioceptive input to the body, the subsequent activation of the brain and spinal cord, and the laying down of “maps” at the nervous system level that let a person internally predict the possibility for movement or the manipulation of objects/tools.

The **vestibular system** is our movement and gravity system. It responds to the position of the head in relation to gravity (allowing us to know whether we are right-side-up or upside down without visual reference) and to accelerated or decelerated movement. It is also a system that functions in the womb. It works both to help with posture, balance, and movement and also joins with proprioceptive, tactile, auditory and visual information to give us our perception of space and our position and orientation within that space. It also helps an individual remain at the appropriate level of arousal to attend. The vestibular system influences: the integration of other sensory information, postural responses, balance, fluidity of movement, muscle tone, and eye movements.



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