

MODALITY	Phenomenological	Neurological	Functional	Psychological	Behavioral	SOURCE NOTES	References
Auditory	Speech sounds indistinct or garbled due to phonemic indistinction (slurring). Details are distinct but coherent gestalts do not form. Social tension arises when subtle changes in tone of voice, facial expression and body language are responded to slowly or missed.	1. Hypoactivity in distal networks of interconnected sensory areas. 2. Morphological or functional abnormality in a brain region (e.g., cerebellum) that forms part of the brain network for multisensory integration. 3. Attenuation in amplitude of P300 waveform.	1. Increased or decreased interpeak latencies in auditory processing center of brainstem. 2. Prolonged temporal binding windows for multisensory events, possibly to compensate for imprecise time-locking of neural responses.	Frustration. Social isolation.	Impaired ability to correctly associate the auditory and visual components of speech. Delayed or stifled language acquisition. Reduced expression of empathy and reciprocity in social interactions.	This is commonly observed and validated by clinical studies which offer numerous complementary and conflicting accounts involving abnormal latencies and inhibitory responses.	Hitoglou et al, 2010. (abnormal interpeak latencies). Kwakye et al (2011) "Altered auditory and multisensory temporal processing in autism spectrum disorders". Seri et al, (2007) "Pre-attentive auditory sensory processing in autistic spectrum disorder. Are electromagnetic measurements telling us a coherent story?" Kwakye et al (2011) "Altered auditory and multisensory temporal processing in autism spectrum disorders". Lepisto et al, 2005, 2006. Russo et al (2009) "Comparative studies of speech resolution in ASD & TS subjects". Gustafsson (1997) "Inadequate Cortical Feature Maps: A Neural Circuit Theory of Autism"
Auditory	Difficulty in resolving speech under quiet circumstances (similar to effect of TD subject with background noise). Addition of background noise results in higher levels of impairment.	Decreased ability of neurons in primary auditory complex to resolve differences in the onset of neural signals.	Difficulties detecting duration changes among auditory stimuli. Impaired ability to discriminate timing information between sequential stimuli.	Developmental delays for language-based skills. Alienation or sense of isolation.	Inattentiveness. Inability to comprehend speech. Delayed, unusual or no response to verbal interaction.		
Auditory	Hypersensitivity to aural environment. Intense pleasure or displeasure at particular sounds.	Excessive inhibitory lateral feedback synaptic connection strengths.	Impaired memory function due to disability to extract features from stimuli.	Inability to perceive language or difficult in perceiving phonemes. Fascination with certain sounds.	Low response to language. Avoidance and/or seeking of certain sounds. Obsessive humming, singing or other verbalizations.	Based on mathematical models that simulate cortical circuits that extract (abstract) features from environment.	
Visual			First-order motion detection is intact (spatial and temporal), but second-order motion detection is impaired.				Kwakye et al (2011) "Altered auditory and multisensory temporal processing in autism spectrum disorders". Blake et al, 2003. (Perception of biological phenomena.) Bertone et al, 2005. (Acuity is dependent on stimulus complexity)
Visual	Details, patterns & optical reality of scenes appear with vivid intensity. Dissociation: Conceptual memory that makes objects recognizable as classes weak or nonexistent.	Excessive inhibitory lateral feedback among neighboring neurons in visual cortex.	Impaired memory function due to disability to extract features from stimuli.	Fascination with detail, repetition and phenomena considered irrelevant by TD.	Stimulus seeking for particular experiences. Intense focus on 'nonsensical' elements of the environment to the exclusion of social & utilitarian features.	Based on mathematical models that simulate cortical circuits that extract (abstract) features from environment.	Kwakye et al (2011) "Altered auditory and multisensory temporal processing in autism spectrum disorders". Rippon et al, 2007.
Visual, proprioceptive	Loss of body awareness.	Poor neural connections across functional regions of brain	Lack of integration among cognitive, emotional & perceptual modules.	Poor or nonexistent body awareness. Confusion. Inability to categorize object or experiences.	Arm flapping, clumsiness, physical boundary issues	First person account. (Williams, Mukhopadhyay)	Williams 1996. Mukhopadhyay 2008.
Tactile	Psychological distress from hugging.		Many forms of social touch generate aversive reactions.	Impaired ability to form affiliative bonds-- not necessarily on part of autistic subject, who may instead develop reactive formations to their perceived rejection of the other.	Shrinks away from counterparts. Negative verbal reaction. Melt-downs or withdrawal.	Identifying the class of afferents that responds to social embraces is a possible research project.	Grandin 1995, 2013. Mukhopadhyay 2008.

Tactile	Pain or psychological distress from social contact on arms, hair or back.	CT-afferents in hairy regions are hypersensitive. Cortical centers that process emotional and social inputs respond negatively.	Many forms of social touch generate aversive reactions.	Impaired ability to form affiliative bonds-- not necessarily on part of autistic subject, who may instead develop reactive formations to their perceived rejection of the other.	Shrinks away from counterparts. Negative verbal reaction. Melt-downs or withdrawal.	Neurological studies inconclusive but pt to role of CT-afferents coded for affiliative touch.	Morrison et al, 2009. Williams, 1996. Mukhopadhyay 2008. McGlone et al, 2007. Cascio et al, 2008. Loken et al, 2009.
Multichannel	Monochannel blackouts of competing modalities	Frontal lobe dysfunction results in weak integration and/or coordination of sensory channels	Seesawing of attention between sensory modalities	Physical disorientation	Freezing, fear, rage, inattention, hypersensitivity to touch, sounds, lights	First person account. (Williams)	Kwakye et al (2011) "Altered auditory and multisensory temporal processing in autism spectrum disorders". Williams, 1996. Mukhopadhyay 2008. Uddin et al (2009) "The anterior insula in autism: Under-connected and under-examined".