Children with ASD show intact statistical word leaning

By Dr Jessica K Edwards

Children with autism spectrum disorder (ASD) and specific language impairment (SLI) exhibit word-learning difficulties early in childhood development. Although the mechanisms underlying these deficits are largely unknown, the Procedural Deficit Hypothesis (PDH) puts forward that abnormalities to the brain structures that constitute the procedural memory system lead to impaired linguistic and non-linguistic function.1 Researchers at the University of Wisconsin have now examined two word-learning mechanisms in school-aged children with SLI (n=23) and ASD (n=25): statistical learning and fast mapping. Statistical learning is a procedural learning process through which regularities and patterns in word sequences are extracted. Under the PDH, statistical learning is crucial for learning rule-based features of language such as grammar and phonology (sounds). Conversely, fast mapping is a declarative learning process through which rapid word acquisition occurs after only a brief exposure to new information. Here, children with SLI exhibited poorer statistical learning compared to typically developing (TD) controls, which is in line with the PDH. However, they also exhibited poorer fast mapping compared to typically developing (TD) controls. Conversely, children with ASD with normal language abilities showed intact statistical learning and fast mapping. Furthermore, those with ASD co-existing with language impairment showed only subtle weaknesses in fast mapping. Despite exhibiting deficits in statistical learning and fast mapping individually, children with SLI showed equivalent word acquisition to children with ASD and TD controls in a combination task, in which they were first exposed to an artificial language to reinforce phonemes before fast-mapping. The researchers propose that here, the additional phonological exposure boosted word-learning performance in children with SLI. These findings counter those that imply that language impairments in ASD stem from deficits in procedural learning,[1,2] and also suggest that children with SLI may benefit from additional phonetic input.

Referring to:

Haebig, E., Saffran, J.R. & Weismer, S.E. (2017), Statistical word learning in children with autism spectrum disorder and specific language impairment. J Child Psychol Psychiatr. 58: 1251-1263. doi:10.1111/jcpp.12734

Further reading:

[1]Ullman, M.T. et al. (2005), Specific language impairment is not specific to language: The procedural deficit hypothesis. Cortex. 41: 399-433. doi: 10.1016/S0010-9452(08)70276-4

[2]Walenski, M. et al. (2006), Language in autism. In so.o. Moldin & J.L.R. Rubenstein (Eds.), Unverstanding autism: From basic neuroscience to treatment (pp.175-203). London, UK: CRC/Taylor & Frances Books.

Glossary:

Procedural Deficit Hypothesis (PDH): abnormalities of the brain structures that constitute the procedural memory system in the frontal/basal ganglia, lead to impairments of the linguistic and non-linguistic functions that depend on it and thus specific language impairment.

Procedural learning: the acquisition of a skill (i.e. how to do something) through repeated performance and practice.

Declarative learning: the acquisition of a declarative piece of information (i.e. knowing that something is the case).

Phoneme: the smallest unit of sound in speech. Phonemes are not the letter itself, but the sound that is made, and thus can consist of more than one letter.