

Contributions of experience to the mind and brain: insights from studies of language in blindness.

Blindness has historically been a test case for resolving nature/nurture questions. Empiricist philosophers reasoned that a person born blind might say “visual” words but could never truly grasp their meaning. According to Locke, a man born blind might say that marigolds are yellow, but to a blind man, yellow would merely refer to a marigold’s texture. Empirical studies of language among individuals born blind contradict Locke’s supposition and challenge current assumptions about neurocognitive development. We find that blind individuals develop rich and accurate causal theories of how color works, but are less likely than the sighted to learn arbitrary verbal color associations (e.g. bananas are yellow). These studies suggest that in the absence of first-person sensory access, linguistic communication is sufficient to support the development of rich conceptual knowledge through inference. While “visual” meanings are resilient to blindness, the neural basis of language changes in a surprising way: parts of cortex that evolved for visual perception undergo dramatic plasticity and are incorporated into the fronto-temporal language network. In those blind from birth, early “visual” cortices become sensitive to grammar and meaning. Blind individuals also show enhanced performance on sentence processing tasks, suggesting behavioral relevance. Studies of blindness suggest that the neural phenotype of language emerges through a dynamic process that includes competition for cortical real estate between language and other cognitive functions. The human brain is ready for language and is transformed by it.