Sensory substitution: closing the gap between basic research and widespread practical visual rehabilitation.

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Created 12/17/2014
By elsc_admin December 17, 2014


Abstract:
Sensory substitution devices (SSDs) have come a long way since first developed for visual rehabilitation. They have produced exciting experimental results, and have furthered our understanding of the human brain. Unfortunately, they are still not used for practical visual rehabilitation, and are currently considered as reserved primarily for experiments in controlled settings. Over the past decade, our understanding of the neural mechanisms behind visual restoration has changed as a result of converging evidence, much of which was gathered with SSDs. This evidence suggests that the brain is more than a pure sensory-machine but rather is a highly flexible task-machine, i.e., brain regions can maintain or regain their function in vision even with input from other senses. This complements a recent set of more promising behavioral achievements using SSDs and new promising technologies and tools. All these changes strongly suggest that the time has come to revive the focus on practical visual rehabilitation with SSDs and we chart several key steps in this direction such as training protocols and self-train tools.

Journal:
Neuroscience and biobehavioral reviews

Volume:
41

Pagination:
3-15

Date Published:
2014 Apr

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