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Fabrication of a 3 dimensional brain puzzle and its application to teaching and research

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Abstract:

This project aims to enhance teaching and research skills, developing perceptual learning of students' brain. In a neuropsychological field, it is well established that students exposed to multiple sensory stimuli simultaneously can improve learning skills. Currently, our research focuses are on the establishment of neurobiological circuits and mechanisms in normal sensory processing and abnormal neurobiological disorders. We often found that it is quite difficult of students to understand a concept, principle, value, and critic of neuroscience without visualization of teaching objects. It is largely due to the complicated organization of neural networks densely connected within the 3D brain structure. Then, we realized a necessity that the teaching methods mostly relying on verbal guidance should be combined with visual stimulation. With help of our brain puzzle model, the scientific findings and phenomena will be readily visualized. There are a few novel features in our proposed brain puzzle: (1) The general shape of brain is fabricated by assembling individual units (or blocks) of transparent materials (e.g., transparent plastic block) so that students can see the inter-and outer-structure of the brain while they are making it on their own; (2) Building-up individual units will provide a fun activity like a type of puzzle games; (3) LED lights embedded in individual units will display neural signal pathways in both healthy and disease conditions when dictated by a user. For example, button push on 'auditory pathway' in a remote controller will visualize the auditory signal pathway from ear (peripheral system) to auditory cortex (a top hierarchy of central auditory station) via visual guidance of LED flickering; (4) The LED module can be connected to a remote controller on the mobile phone in which a screen in mobile application can control the LED light path. The 3D brain puzzle can be utilized for highlighting students' intellectual challenges and excitement in a class, thereby encouraging active discussion during a class. Therefore, it will provide a novel teaching and research material for the worldwide education community. Student/technical assistant and I will do design, material purchase and fabrication for the 3 D brain puzzle.