Chess masters help researchers understand how we see the world

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(Medical Xpress) -- Just as expert chess players scrutinize a board to calculate their next moves, UT Dallas cognitive neuroscientists are studying the way these players' brains work to better understand how visual information is processed.

In three recent papers, Dr. James Bartlett, Dr. Daniel Krawczyk and doctoral student Amy Boggan of the School of Behavioral and Brain Sciences (BBS) discuss whether an expert chess player's analysis of a board is similar to the attention paid by most people to new or familiar faces.

By deciphering how humans process visual information, researchers are

uncovering new ways to improve eyewitness testimony, enhance teaching methods or increase people's ability to learn more efficiently.

Behavioral findings appear in the *Journal of Experimental Psychology: General* (in press). Boggan and another PhD student, Chih-Mao Huang of the University of Illinois at Urbana-Champaign, had a related Journal Club paper in the Nov. 23 issue of the *Journal of Neuroscience*. The neuroimaging findings appear in the July 20 issue of *Neuroscience Letters*.

The researchers recruited nearly 30 UT Dallas chess team members beginning in 2009. UT Dallas' chess team is consistently ranked among the nation's best, so the participants were highly expert players. Recreational players from the school's chess club and novice student participants also volunteered for the study. Part of the research is taking place at UT Dallas' Center for BrainHealth, where Krawczyk is an assistant professor.

Study participants viewed a series of interleaved chess game boards and faces, noting whether each presentation matched the previous game position or face. With faces, chess experts, recreational players and novices demonstrated a so-called congruency effect, considered a hallmark of face processing. But only chess experts demonstrated a congruency effect with chess, suggesting that they process chess games more holistically than less-experienced players.

In another study, the researchers used functional magnetic resonance imaging (fMRI) to map the reactions inside the players' brains when they viewed faces, chess positions, randomized chess positions and other objects. While typical brain areas associated with face recognition were not particularly responsive to chess game displays, other areas of the brain were identified that were sensitive to whether games were normal games or had pieces randomly placed about the board.

Researchers now can expand their investigations to look at how the brains of chess players react to certain types of visual stimuli in various situations. As they observe the chess players' neurological reactions, they can gain insight regarding how human beings capture visual information and then turn it into knowledge.

The neuroscientists predict this newfound understanding of visual recognition will help with efforts to improve learning and increase expertise. If scientists understand how people naturally process information to reach a conclusion, they might be able to improve processing mechanisms or take other steps to help individuals make better use of information.

"We hope to extend this work to develop training techniques to foster holistic processing in other domains," said Bartlett, a professor in BBS. "Harnessing the power of holistic processing may help improve skilled performance in a range of real-world contexts."

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