

Brain Scans Track Hoop Fans' Happy Memories

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Subjects watched game video that froze just as a shot was released and had to recall if it went in or not. Courtesy of Duke Athletics

(PhysOrg.com) -- In a novel study that used historical tape of a thrilling overtime basketball game between Duke and the University of North Carolina at Chapel Hill, brain researchers at Duke have found that fans remember the good things their team did much better than the bad.

It's serious science, aimed at understanding the links between emotion and memory that might affect <u>Post-Traumatic Stress Disorder</u> and how well people recall their personal histories.

Struggling to find a way to measure a person's brain while subjecting



them to powerful emotions, Duke scientists hit on the idea of using basketball <u>fans</u> who live and die with each three-pointer. Using game film gives researchers a way to see the brain deal with powerful, rapid-fire positive and <u>negative emotions</u>, without creating any ethical concerns.

"You can get much more emotional intensity with a basketball film than you could ethically otherwise," said study co-author David Rubin, the Juanita M. Kreps Professor of Psychology & Neuroscience at Duke. Similar studies, for example, might use pictures of flowers versus mutilated bodies.

Two dozen college-aged men from both Duke and UNC who had passed a basketball literacy test to determine their true fandom were shown an edited tape of the Feb. 3, 2000 game at UNC's Dean Smith Center, which Duke won 90-86 in overtime. They watched the full game three times with a few like-minded friends, and then went into an MRI machine individually to watch a series of 12-second clips leading up to a shot. Each of the 64 taped segments ends just as a player releases the shot, and the subjects had to answer whether it went in the basket or not.

Test subjects were more accurate at remembering a successful shot by their own team than a miss by their team or a successful shot by the other team. Positive emotion improved their memory and "broadened their attention," according to neuroscientist Kevin LaBar, who co-authored the study, which will appear Feb. 10 in the *Journal of Neuroscience*.

What the researchers saw in the MRI scan is multiple areas of the brain being recruited to assemble a memory. The fan's connection to the game includes an emotional component from the amygdala, a memory component from the hippocampus, and some empathy from the prefrontal cortex as the subject feels some relation to the player or to the



other fans on his side, LaBar said. Some of the sensory-motor areas light up, too, as if the subject is imagining himself as the shooter. Brain areas that control attention were more active for plays that benefitted the fan's team than for those that did not.

These brain regions function together to improve memory storage, particularly for emotionally intense plays, said LaBar, who is an associate professor of psychology & neuroscience.

Unfortunately, traumatic events can be stored in memory the same way, making them persistent and difficult to handle, said Rubin. "Brain imaging provides details we could not get with earlier technologies, such as studies of brain damage."

Ongoing studies by the same researchers are monitoring fans in real time as they watch a game to get a glimpse of what brain areas are involved in forming positive and negative memories in the first place. Rubin would also like to see how the brains of emotionally impaired and depressed people might respond differently.

A pilot study for the basketball experiment included a half-dozen women who had passed the super-fan test, but even after five or six showings of the game, their recall of the shots was too low to be useful. The researchers aren't sure why that happened, but would like to try again with women who played basketball or by using a tape of a women's basketball game to see if that makes a difference.

Rubin said the Duke fans and the UNC fans did equally well on the recall test, though the Duke fans tended to answer quicker and tended to be more sure of themselves. "They thought there were better, but they weren't," he said. Roberto Cabeza, a professor of psychology & neuroscience, Anne Botzung, a postdoctoral fellow, and Amanda Miles, who is now a graduate student, also participated in the research, which



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Provided by Duke University

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