

# Computer game helps patients align their eyes

**Study conclusion:** A version of a Pac-Man computer game corrects eye alignment condition.

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**Study focus:** A computer game, a three-dimensional version of Pac-Man, helps patients with a condition called convergence insufficiency learn to align their eyes.

Symptoms usually associated with the condition — which affects five per cent of the population — include headaches, blurred vision, double vision, eye strain and reading problems. It is typically treated with exercises requiring repeated convergence of the eyes.

But conventional rehabilitative vision therapy, involving repetitive practice by patients, is monotonous and dull. This results in low levels of compliance by patients, especially among younger ones.

Depending on the patient and the condition, vision therapy can be performed either at home under the supervision of an eye-care professional or in the professional's office. Office-based therapies are more effective, but are more costly and time-consuming.

The study explored the use of computer games for vision therapy, particularly how they can be used in treatment at home.

A modified Pac-Man game was created and tested with a small number of individuals. Results show clinical improvements, as well as high levels of compliance and motivation. Also, the game

was able to objectively track patient progress and compliance.

Patients played the game 20 minutes a day, five days a week, over a two-week period. As they advanced through the game, the coordination of their eyes improved. As well, some felt less eye strain when looking at nearby objects.

Patients were equipped with a 3-D viewer called a stereoscope. With their eyes in the right position, they could see the 3-D images hidden in the game, and advance to the next level.

In the Pac-Man game, players navigate Pac-Man through several mazes collecting pellets and power pellets while avoiding four ghosts that emerge from a central cage on the board. Players advance to subsequent levels by collecting all pellets. Collecting power pellets makes Pac-Man invincible for a

short time. If Pac-Man is not invincible and he touches a ghost, then he will die and all characters will be returned to their starting positions in the maze.

The game is divided into a split-screen format; sets of mirrors in the stereoscope — one set per eye — are directed to opposite halves of the screen. Each eye sees two displays: a 3-D representation of the game and random-dot images containing hidden stereoscopic geometry.

Researchers can manipulate these mirrors to vary the distance between them in order to control the angle at which the eyes converge. The hidden stereoscopic imagery is essential to advancement in the game and provides a check that players have their eyes in the correct position.

**Results:** Results suggest the game will improve compliance on

vision therapy exercises. Successful vision therapy for these patients can reduce the frequency of headaches, focusing difficulties, eye strain and double vision when performing near work or reading associated with the condition.

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**Source:** University of Waterloo communications and public affairs department.



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