In PC and XBOX war games, are military personnel's fixations patterns different compared to civilians'?

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Background

The use of digital tools for training and learning purposes has been growing in recent years, mainly due to a rapid technology development in the gaming and entertainment area [1]. Advances in game artificial intelligence, better human/computer interface, and stunning graphics capabilities have contributed to make video games interactive, adaptive and intelligent learning tools [2]. Gaming has been used effectively in areas where learning or training is difficult and costly in real and practical life [3]. However, appropriateness, practicability and effectiveness should be considered before using a particular game in a particular area of training [4].

For a long time, Armed Forces around the world have been using digital tools for training purposes [1]. These tools include at one end high cost, full-sized, sophisticated simulators with hydraulics, wall-sized video screens and realistic cockpits. At the other end, they include low-cost, relatively easy to develop and deploy computer based video games [5]. Many video games nowadays are specifically developed for military training purposes [5]. Such tools may be developed particularly for training and recruiting purposes, as is the case with the First to Fight-game.

Visual search strategies are critical elements for successful performance in the games [1]. Hence, it is important to study, before deploying any digital training tool, how war fighters search for visual information in a war game. The aim of the study was to compare military trained personnel with civilians, with respect to fixation duration and number of fixations on objects of interest (OoI) and areas of interest (AoI), and whether or not the gaming console had an impact on the fixations patterns.

Methods

In total, 20 military and 20 civilian subjects played 'First to Fight' on two different consoles, i.e. XBOX and PC, with a head mounted eye tracking device. All subjects played the game twice, i.e. on both consoles, in a fully balanced order. A questionnaire was used to get their views on the game environment. In total, 27,081 fixations were generated through a centroid mode algorithm [6] and analyzed; 13,101 fixations (48%) from Military personnel and 13,980 (52%) fixations from Civilians. The analyses were made manually, frame-by-frame. χ^2-test was used for dichotomized variables, paired samples and independent samples t-test for comparison of normally distributed interval variables. The α-level was set to .05 for all tests.

Results

The results showed that military trained personnel's visual search strategies were different form the civilians' when it comes to video game based war. Fixation durations were, however, equally short, i.e. about 170 msec, for both groups. To our surprise the military trained personnel's fixation patterns were less orientated towards objects of interest and areas of interest than the civilians'; as shown in table 1 (χ^2 =82.35, df 1, p<0.001) and (χ^2 =42.60, df 1, p<0.001) respectively, the underlying mechanisms remaining unclear.

Military training was apparently not advantageous with respect to playing the 'First to Fight' video game. The PC console seemed to be advantageous over XBOX, with respect to fixation duration (t=4.595, df 27,079, p<0.001), and Military trained personnel fixated more often on OoI when they play PC first than when they played XBOX first (χ^2 =57.10, df 1, p<0.001), whereas no difference was found with respect to AoI and the order of consoles played. Furthermore, their fixations were shorter when they played PC first than when they played XBOX first (paired sample t=-198.68, df 13,100, p<0.001). Civilians, on the other hand, showed a contradictory pattern. They fixated more often both on OoI (χ^2 =5.93, df 1, p<0.05) and AoI (χ^2 =40.94, df 1, p<0.001) when the played XBOX first. However, their fixations were shorter when they played PC first than when they played XBOX first. (paired sample t=-198.16, df 13,979, p<0.001).

Table1. *The distribution of the 27,081 fixations with respect to OoI/OO and AoI/OA among military personnel and civilians, and with respect to the two platforms.*

	Fixations on OoI	Fixations on OO*	Total	Fixations on AoI	Fixations on OA**	Total
XBOX	5,215, 35.6%	9,449, 64.4%	14,664 100%	10,537, 71.9%	4,127, 28.1%	14,664 100%
PC	4,620, 37.2%	7,797, 62.8%	12,417, 100%	8,605, 69.3%	3,812, 30.7%	12,417, 100%
Total	9,835, 36.3%	17,246, 63.7%	27,081 100%	19,142, 70.7%	7,939, 29.3%	27,081, 100%

* Other Objects, **Other Areas

Conclusions

Military trained personnel's visual search strategies are different from civilians' when it comes to video game based war. Their fixation patterns were less orientated towards objects of interest and areas of interest than the civilians'. The PC console was advantageous over XBOX.

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