

# Capturing gaze behavior patterns of surfers during surfboard riding: A pre-study in testing a water housing system for mobile eye tracking technology

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## 1 Introduction/Related Work

Due to the fact that the sport of surfboard riding occurs in a fluid and ultra dynamic environment it is to be expected that several visual focuses of attention are leading to either better or worse outcomes of performance [1]. Research in several sport disciplines shows that there are marked differences in visual search strategies between expert athletes and recreational athletes[3] and that gaze training improves athlete performance[4]. The quantification and visualization of gaze behavior patterns by fixation count and fixation duration on *AoI* (Areas of Interest) represents an extensively applied method in sport research [3; 5]. To record gaze behavior patterns from surfers, a water-housing prototype (see Fig. 1) for mobile eye tracking technology was built. Hence, the principle aim of this work is to test the operability of the water housing system. Through the theoretical baseline of the constraints-led perspective [2] and the expert performance approach [5], the secondary aim is a qualitative description of vision in action during surfboard riding for the first time and also to identify visual hot spots of expert surfers whilst performing carving turns.



Fig. 1. An expert surfer performs a carve turn whilst wearing the *Tobii Glasses 2* in the water-housing system and the recording-unit on his back.

## 2 Our Contribution

To control the research constraint “environment” the study was held at the stationary river wave (Eisbach) in Munich. As subjects, 2 expert surfers (professional status) and 2 recreational surfers were analyzed. The constraint “task” was defined as doing 5 carve turns per surfing run. The subjects had to perform 2 runs. As research instrument the mobile eye tracker model *Tobii Glasses 2* was used and the software analysis was performed with the *Tobii Pro Glasses Analyzer*. To process and classify the recorded gaze data samples into fixations and other eye movement categories the *Tobii I-VT fixation filter* was used. Through qualitative gaze plots presented with heat maps and scan paths, the results are showing inter-subjective differences in fixation duration and fixation count between experts and recreational surfers (see Fig. 2 and Fig. 3).

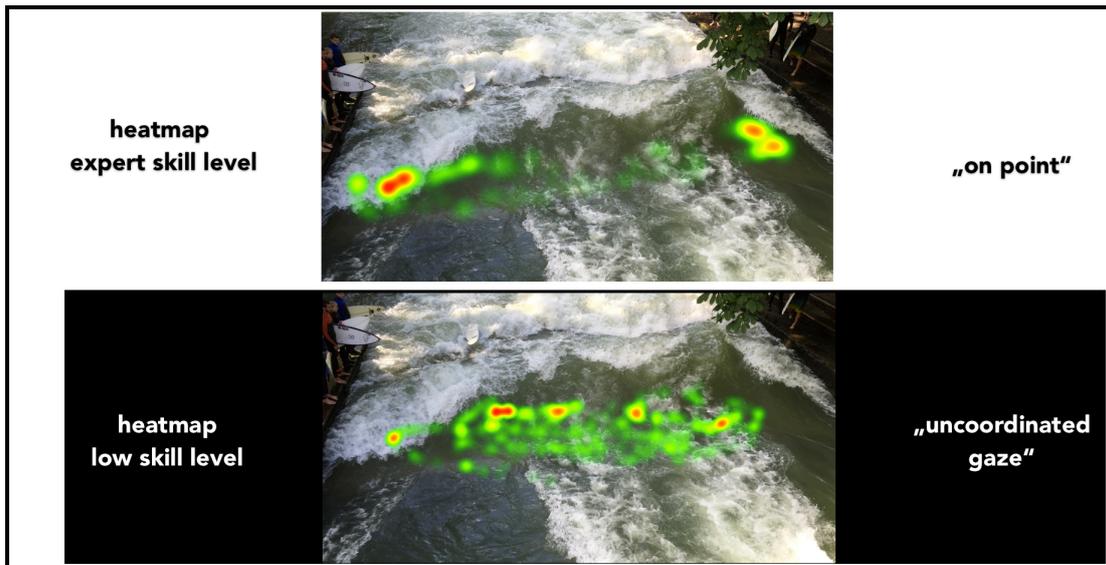


Fig. 2. Cumulative visual hot spots of expert surfers (n = 2) and recreational surfers (n = 2) showing subjective differences during 5 turns.



Fig. 3. Eye movement patterns showing qualitative relations to the surfboard direction.

### 3 Discussion

Because of differences in gaze recognition rate by the hardware system, which varied from 32 percent to 87 percent between the subjects, no inference statistic analysis was performed. This research represents a pilot study for eye tracking in water sports. Therefore, the method, treatment, analysis and research prospects are open for discussion. How *quiet eye* studies can be performed with the presented materials in water environments, are to discuss on an interdisciplinary level.

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