

Peripheral vision in martial arts: How anchoring gaze helps athletes in Kung Fu and Tae Kwon Do



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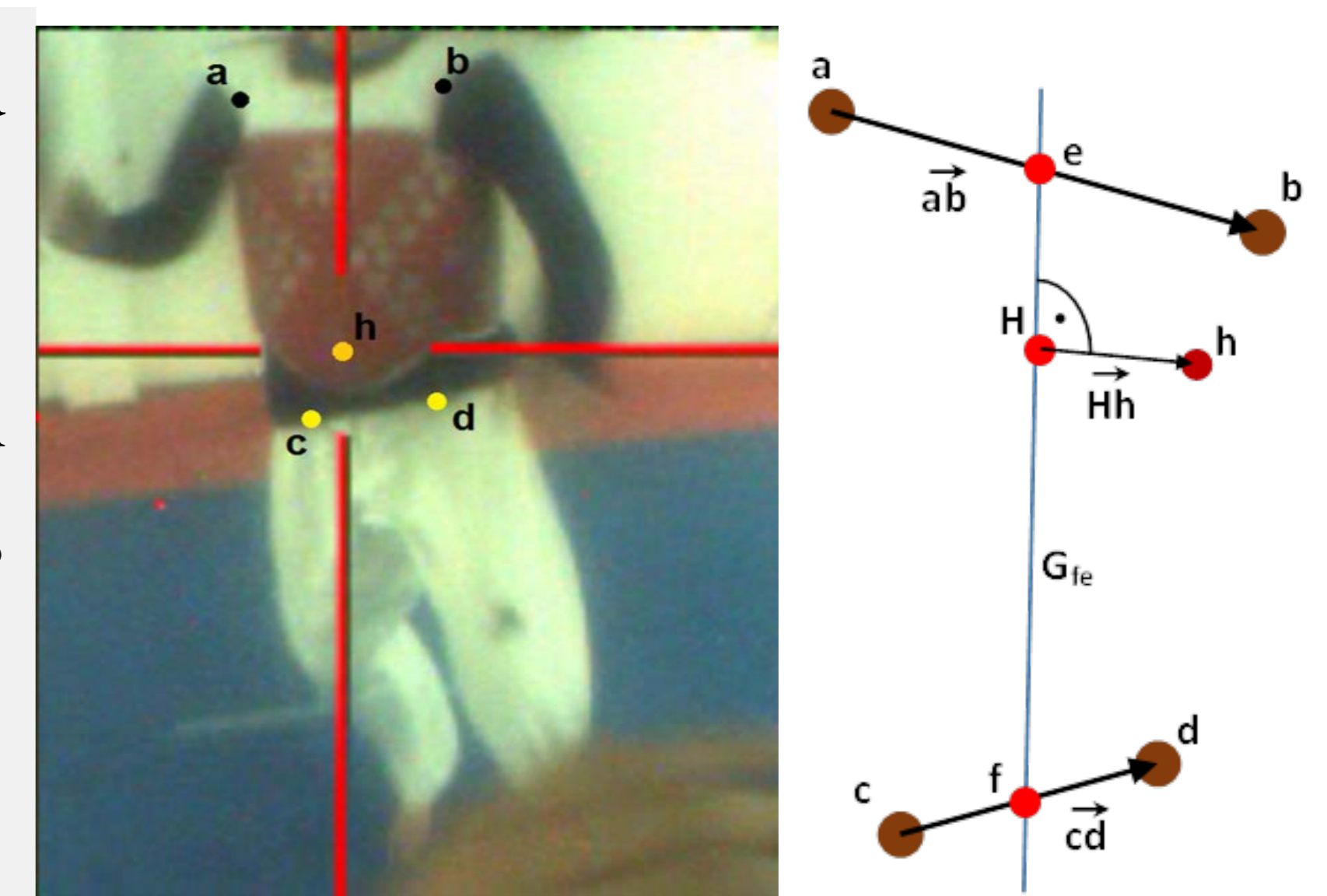
1 Introduction

In martial arts, athletes anchor their gaze on a specific location on the opponent's body to optimally use their peripheral vision for defending attacks (Ripoll et al., 1995; Williams & Elliott, 1999). If anchoring is functional to use peripheral vision, the height of gaze anchoring should differ between martial arts. For example, in Kung Fu (Qwan Ki Do, QKD) arms and legs are used for attacks, whereas in Tae Kwon Do (TKD) the legs are regularly used for attacks. Thus, to minimize the distance from the location of gaze to possible locations of attacks, a difference in the height of gaze anchoring in QKD should be higher compared to TKD. This was tested in an in situ experiment with QKD and TKD experts.

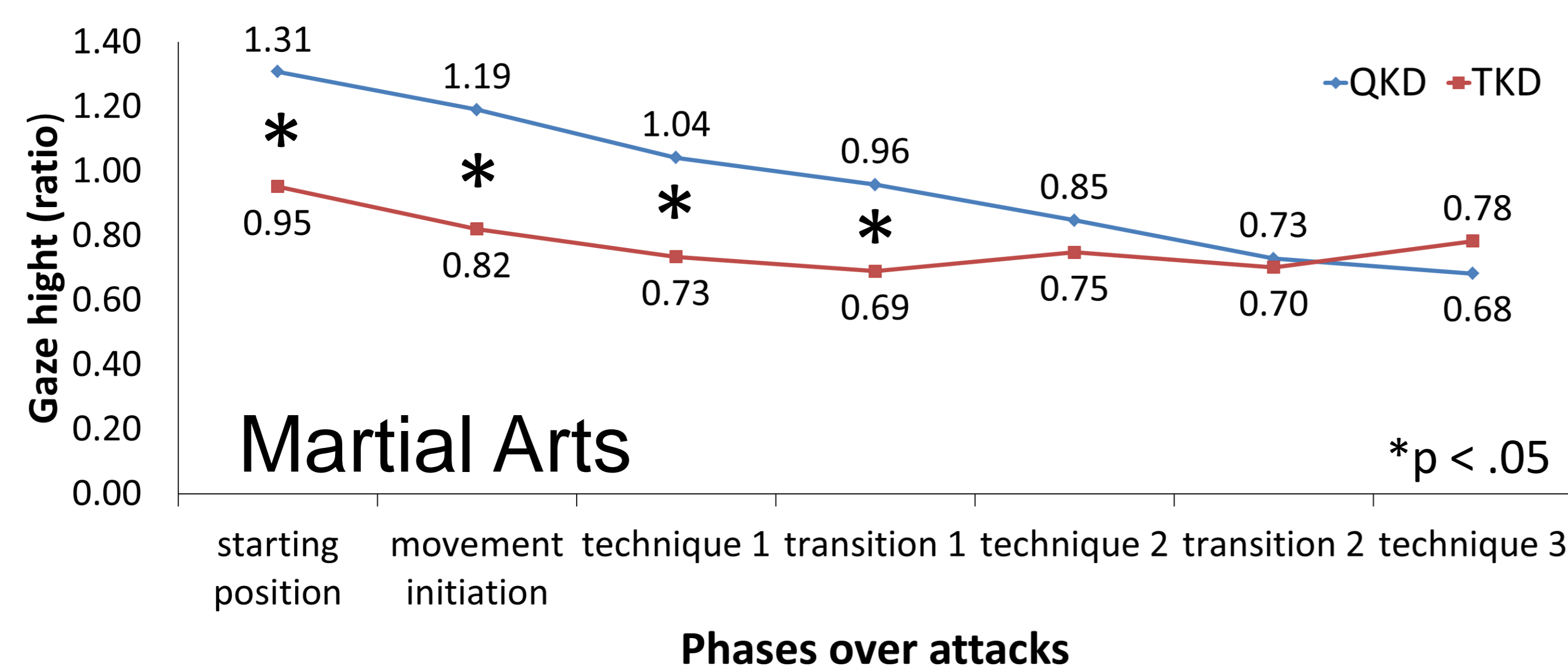


2 Methods

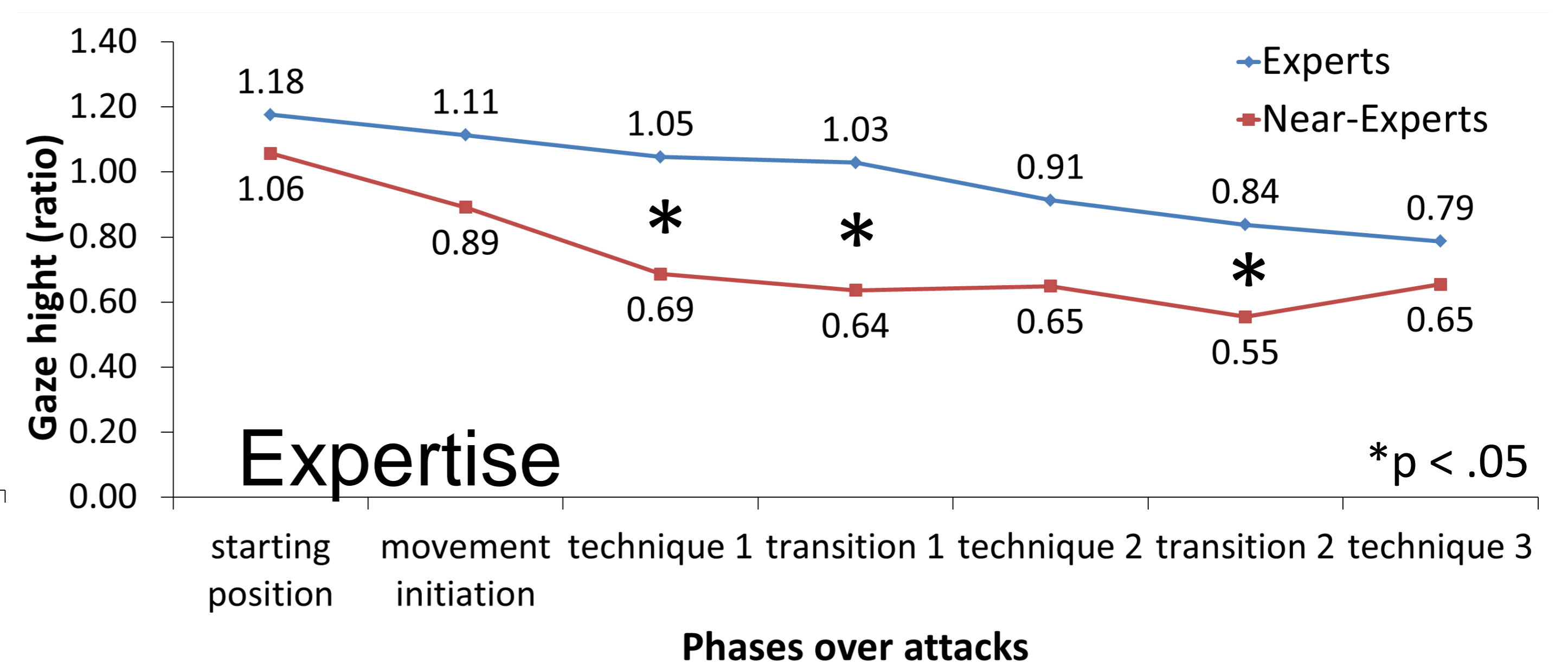
- 10 QKD and 10 TKD athletes (regardless of martial arts, athletes were subdivided in 10 experts and 10 near-experts for expertise comparison)
- 24 martial arts specific attacks (varying in complexity) in randomised order
- EyeSeeCam (Eyetracker) used to identify fixations with a saccade detection algorithm in 7 phases (starting position, movement initiation, technique 1, transition 1, technique 2, transition 2, technique 3)
- Vector geometry to locate gaze anchoring (see figure on the right)
- Dependent variable: gaze height ratio (1= shoulder line, 0 hip line)



3 Results



Lower anchoring in TKD-Athletes gaze!!!



Rather low anchoring in Near-Experts !!!

Statistics: ANOVA repeated measures

Independent variable	Within subject		Between subject
	Phase	Phase * Martial Art / Phase * Expertise	Martial Art / Expertise
Martial Arts	F(3.19, 54.27) = 20.06, p < .001, $\eta_p^2 = .54$	F(3.19, 54.27) = 5.20, p < .01, $\eta_p^2 = .29$	F(1, 17) = 2.032, p = .086, $\eta_p^2 = .107$
Expertise	F(2.41, 40.90) = 17.33, p < .01, $\eta_p^2 = .51$	F(2.41, 40.90) = 1.624, p = .205, $\eta_p^2 = .087$	F(1, 17) = 2.998, p = .1, $\eta_p^2 = .15$

4 Discussion

As predicted, the height of gaze anchoring varied as a function of martial arts. QKD athletes anchored their gaze higher than TKD athletes until the end of technique 1. Results further show that especially QKD athletes anchored their gaze around the opponents shoulder line, even when kicks were performed. Thus, a rather high anchoring of gaze and the accompanied use of peripheral vision seems to be functional to quickly react to opponent's attacks. This practically relevant finding should especially be taken into account for training youth martial arts athletes.

Literature

- Ripoll, H., Kerlirzin, Y., Stein, J.-F., & Reine, B. (1995). Analysis of information processing, decision making, and visual strategies in complex problem solving sport situations. *Human Movement Science*, 1995 (14), S. 325–349
- Williams, A. M. & Elliott, D. (1999). Anxiety, expertise, and visual search strategy in karate. *Journal of Sport & Exercise Psychology*, 21 (4), S. 362–375