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Convergence Accommodation versus Accommodative Convergence.

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Ahn and coworkers<sup>1</sup> present their findings regarding the level of accommodation, monocularly and binocularly, in patients with intermittent exotropia. They note that 'binocular interaction of visual acuity is associated with accommodative response'(p984), with which we agree. However they assume that this is due to accommodative convergence.

In the person trying to maintain binocular single vision during forced convergence, Semmlow and Heerema<sup>2</sup> demonstrated that the blur was due to convergence accommodation, not accommodative convergence as on removal of the stimulus the vergence after response was in the convergence direction. This was due to accommodation actively being brought back into play (otherwise divergence would be expected as accommodation relaxed).

Hasebe et al<sup>3</sup> found that in intermittent exotropes and decompensating exophorias a larger lag of accommodation occurred in the monocular state compared with binocular, and patients with lower as well as higher accommodative convergence to accommodation (AC/A) ratios had been shown to respond to minus lens therapy (for review see Firth<sup>4</sup>). If the mechanism was accommodative convergence only those with high AC/A would be expected to respond.

These findings led Firth<sup>4</sup> to argue that the increase in accommodation in patients with intermittent exotropia, when binocular, was due to convergence accommodation. In a closed loop condition convergence accommodation is normally inhibited, however, as the limit for this is reached the patient has to accept either blur or become manifest. Minus lens therapy may be used to allow convergence accommodation to occur and give clear vision.

Indeed this was demonstrated (Firth AY, Davis H. Convergence accommodation in a distance exotrope. British Isles Paediatric Ophthalmology and Strabismus Association Conference Glasgow 23<sup>rd</sup>-25<sup>th</sup> September, 2009) in a patient with reduced CBA of 6/18 due to an increase of accommodation of about 2D in the binocular state compared with monocularly. The patient's AC/A ratio was low and dissociated measurement of the deviation showed no observable difference when viewing through -3.00DS lenses.

Recently, Horwood and Riddell<sup>5</sup> found that disparity-driven accommodative response gain and accommodative response at 33cm are higher in controlling intermittent exotropes than in matched non-strabismic controls. The participants showed higher convergence accommodation to convergence (CA/C) ratios, and responded mainly to the disparity in visual targets to drive responses, as did controls. They suggest that the increased vergence necessary to control the exodeviation brings along over-accommodation, so explaining the blur and loss of stereopsis found by Ahn et al.<sup>1</sup> Also, they found no evidence that any of the exotropes used blur cues to drive their responses any more than did the controls, and their response AC/A ratios were no higher. In simple terms, the need to converge drives accommodation, rather

than accommodation being used to drive convergence. Considerable inter-individual variability in the strength of the association between convergence and accommodation account for this not being a universal finding.

Whilst various literature, as included by Ahn et al.,<sup>1</sup> refers to the mechanism for controlling an intermittent exotropia as being accommodative convergence, our findings challenge this premise. We contest that the mechanism behind the change in accommodation is vergence driven.

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### **References**

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