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An automated accommodative facility test with unpredictable stimuli

Jaume Pujol; [CARLES OTERO MOLINS](#); [Mikel Aldaba](#); [Silvia Lopez-Bausili](#); [Fernando Díaz-Doutón](#); [Fuensanta A Vera-Diaz](#)

[+ Author Affiliations & Notes](#)

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Abstract

Purpose : To study the accommodative dynamics for predictable and unpredictable stimuli using manual and automated accommodative facility tests

Methods : Seventeen young healthy subjects (mean age 23 ± 2 years) were tested monocularly in two consecutive sessions, using five different conditions in each session. Two conditions replicated the conventional monocular accommodative facility tests for far and near distances, performed with manually held flippers. The other three conditions were automated and conducted using an electro-optical system and open-field autorefractor. Two of the three automated conditions replicated the predictable manual accommodative facility tests. The last automated condition was a hybrid approach using a novel method whereby far and near accommodative facility tests were randomly integrated into a single test of four unpredictable accommodative demands

Results : The within-subject standard deviations for far and near distance were ($\pm 1, \pm 1$) cpm for the manual flipper accommodative facility conditions and ($\pm 3, \pm 4$) cpm for the automated conditions. The 95% limits of agreement between the manual and the automated conditions for far and near distances were poor: (-18, 12) and (-15, 3).

During the hybrid unpredictable condition, the response time and accommodative response parameters were significantly ($p < 0.05$) larger for accommodation than

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disaccommodation responses for high accommodative demands only. The response times during the transitions 0.17/2.17 D and 0.50/4.50 D were not significantly different between the hybrid unpredictable and the conventional predictable automated tests

Conclusions : The automated accommodative facility test does not agree well with the manual flipper

test results, for either far or near distances. It is likely that operator delays in flipping the lens account for these differences. The novel hybrid test using an unpredictable accommodation demand level provides a more comprehensive examination of the accommodative dynamics than the conventional manual accommodative facility tests. Unexpectedly, the unpredictability of the stimulus did not to affect accommodation dynamics

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