The quick reading method: its efficiency and accuracy in assessing reading performance in the periphery <# 3278 >

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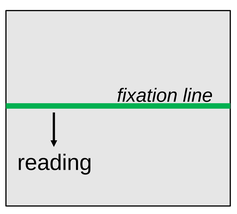
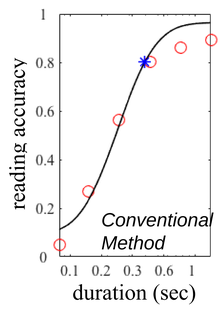
Purpose: Patients with central vision loss have to rely on their peripheral vision for reading. Accurate assessment of reading performance can help prescribe suitable adaptive devices to the patients. In this study, we develop an adaptive method, quick reading (qRD), to measure reading speed in the periphery. While the conventional method is adequate, qRD utilizes a Bayesian adaptive framework to select optimal stimuli, thus allowing for an efficient assessment of reading speed in the periphery.

Methods: Seven normally-sighted observers participated. We used a rapid serial visual presentation (RSVP) paradigm where words were serially presented at 10° eccentricity in the lower field. The number of words correctly reported were recorded.





RSVP Method

The conventional (method of constant stimuli) procedure involved measuring reading accuracy as a function of exposure duration. Reading speed at a given print size is defined as the duration at which subject's response is 80% correct. The reading speed versus print size function was estimated by measuring reading speed at five print sizes (a total of 180 trials).

Testing with the conventional RSVP method requires ~1 hour of testing for only 5 print sizes.

Quick Reading Method

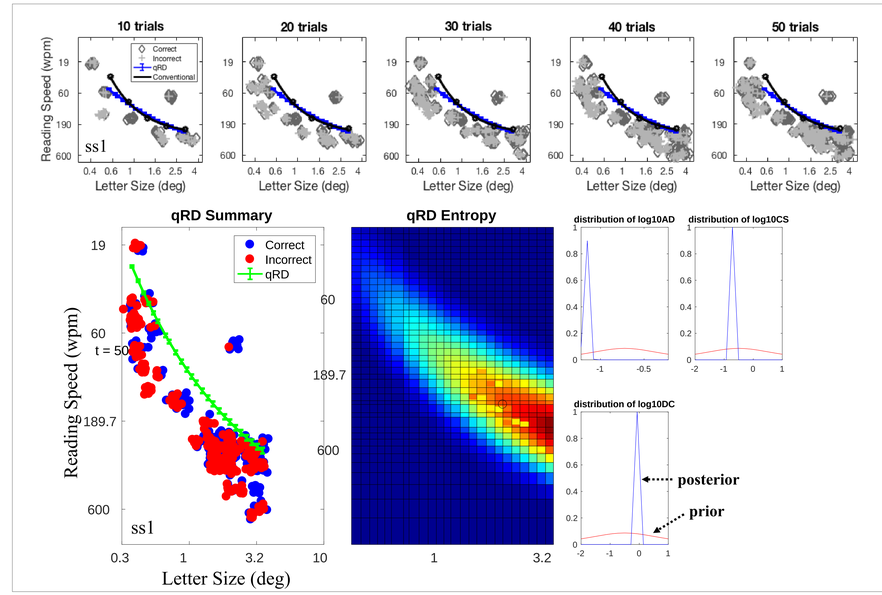
1) In the qRD procedure, reading speed versus print size was described by an exponential function with three parameters (asymptotic performance level, print size corresponding to a reading speed of 6 wpm, and a decay constant).

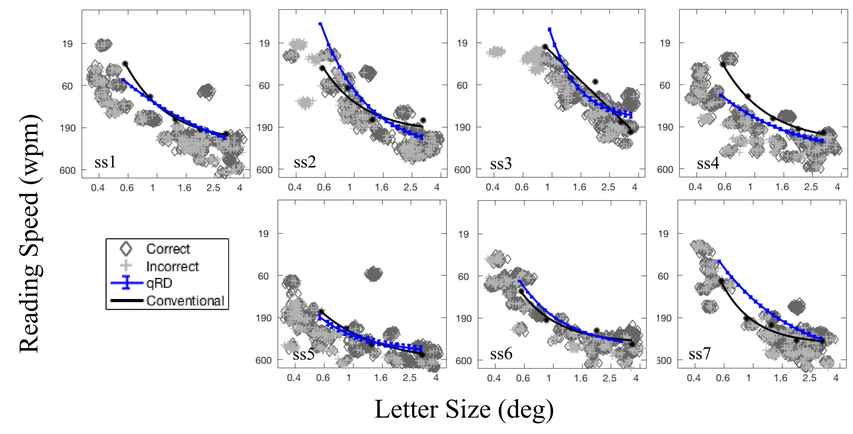
2) Following each trial (50 trials total), posterior distributions of the parameters were updated based on subject's response, and stimulus condition (print size and exposure duration) was selected to provide the maximal expected information gain for the upcoming trial.

The Quick Reading method requires ~12 mins of testing and also allows for a large array of possible test stimuli (e.g. 25 print sizes x 50 exposure durations).

Results: Reading curves (reading speed vs. print size) estimated using the two methods were comparable across observers (area under curve: $t(6)=2.44$, $p=0.72$). The conventional data was analyzed using the Bayesian fitting component of qRD. A paired-samples t-test was conducted to compare 68.2% credible intervals between the qRD and conventional methods. The qRD method was more precise (i.e. smaller credible intervals) than the conventional method when considering only 50 conventional trials ($p=0.01$) and similar when 180 conventional trials were included ($p=0.50$).

Conclusions: The current investigation demonstrates that the qRD method can adequately measure reading function in the periphery but with higher precision than the conventional method when only 50 conventional trials are considered.





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