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# Bayesian Adaptive Assessment Of Reading Performance: The Quick Reading Method

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## Introduction

Reading is a fundamental skill ~~and the reading~~ performance is a key endpoint for quantifying normal or abnormal development and aging. ~~The deficit~~ or pathology in ophthalmic, cognitive or oculomotor functions can lead to ~~a deficit in~~ reading performance (Legge et al 1985). Despite its importance for clinical and developmental assessment, existing reading tests are time consuming and difficult to administer.

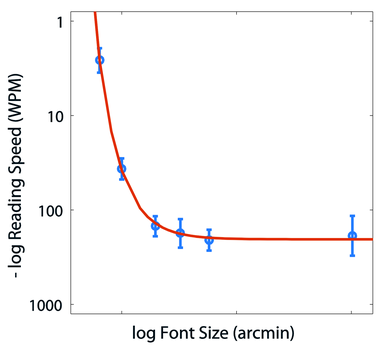


Figure 1. A typical reading speed vs. letter size function.

## Reference

Kontsevich, L. L. and C. W. Tyler (1999). "Bayesian adaptive estimation of psychometric slope and threshold." Vision Res 39(16): 2729-2737.
Legge, G. E., G. S. Rubin, D. G. Pelli and M. M. Schleske (1985). "Psychophysics of reading--II. Low vision." Vision Res 25(2): 253-265.

## Disclosure

LL: Adaptive Sensory Technology, Code I, P, E;
PB: Adaptive Sensory Technology, Code I, P;
ZL: Adaptive Sensory Technology: Code I, P; FH: Code P; DY: Code P;

## quick Reading

$$-\log10(\text{speed}) = \log 10(\text{duration}) = f(\alpha, \kappa, \tau)$$

$$= \alpha + (1-\alpha)\cdot \exp\left(-\frac{(\log10(\text{letter size}) - \kappa + \log10(\text{frameRate}/60))}{\tau}\right)$$

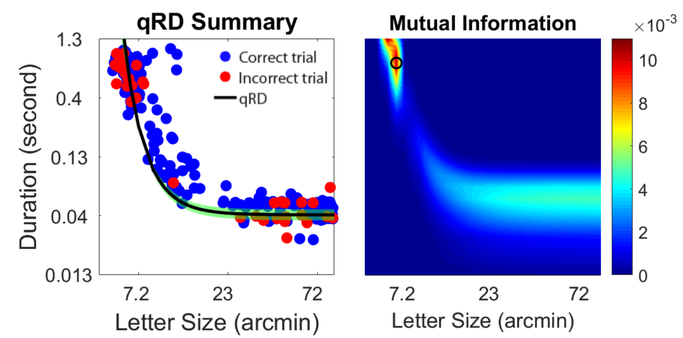


Figure 2. Left, the qRD method distributes trials around ~~threshold~~; Right, the qRD method selects the stimulus to maximize the information gain.

## Simulation

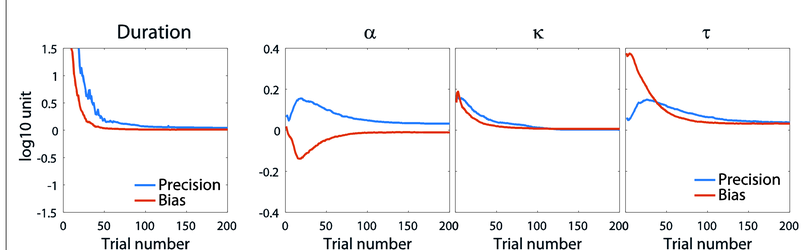


Figure 3. The precision and bias of estimated reading curve and ~~curve~~ parameters as functions of trial number

## Experiment

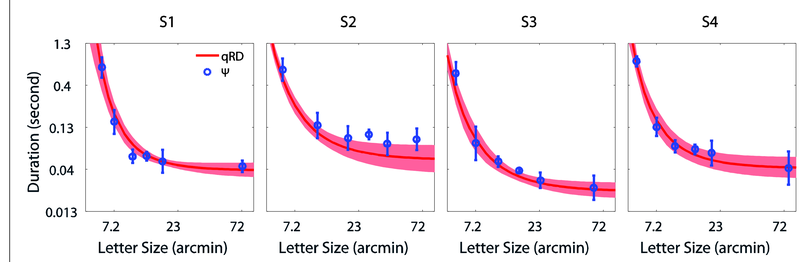


Figure 4. Reading curves measured by ~~two methods~~

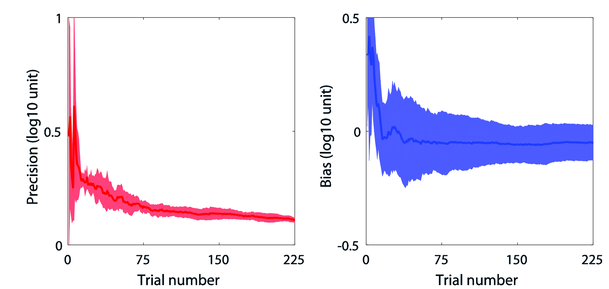


Figure 5. Precision and bias ~~curves from human~~ experiment

## Summary

The quick Reading method can be used to precisely and efficiently assess reading performance, with great promise in clinical applications.

## Acknowledgement

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