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A Theory of Visual Attention Based Assessment of Font Style

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A Theory of Visual Attention Based Assessment of Font Style: How important is x-height for font legibility?

Purpose

We examined the importance of a font's x-height for letter recognition. The height of the lowercase letter **x**, dictates the height of letters like **a c e m n o r s u v w z** and the bowl of letters like **b p q d**. Within typography, the 'x-height' is often considered to be the defining factor of the perceived font size, and consequently, its legibility. Within the reading literature, such detailed font style variables are often considered to be less important. In either case, rigorous study is lacking.

Experiment 1

abcdefg^A
abcdefg^B
abcdefg^C
abcdefg^D

abcdefg

· same point size
· varying x height
· varying extenders

Experiment 2

abcdefg^A
abcdefg^B
abcdefg^C
abcdefg^D

abcdefg

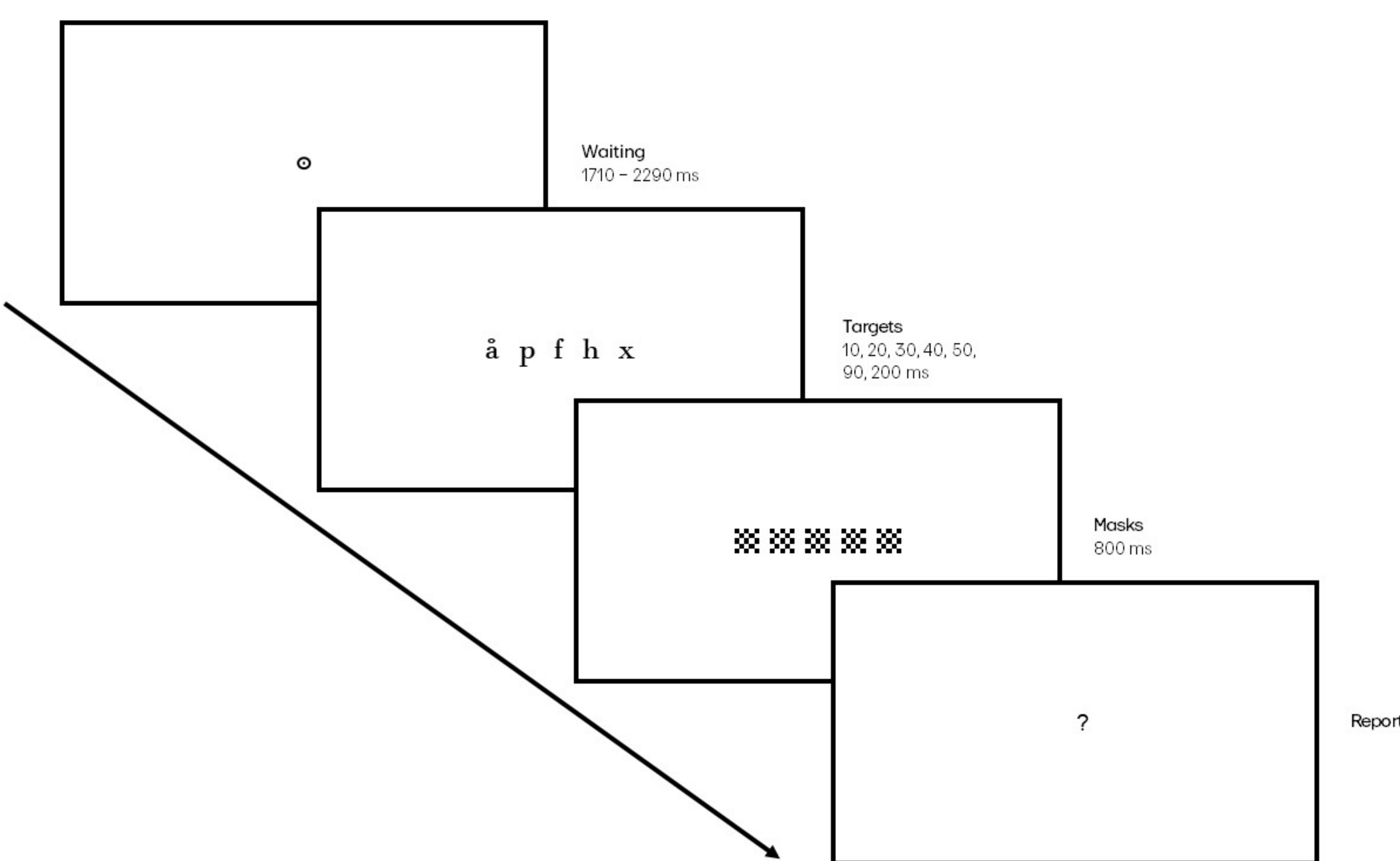
· same x-height
· varying extenders

Experiment 3

abcdefg^A
abcdefg^B
abcdefg^C
abcdefg^D

abcdefg

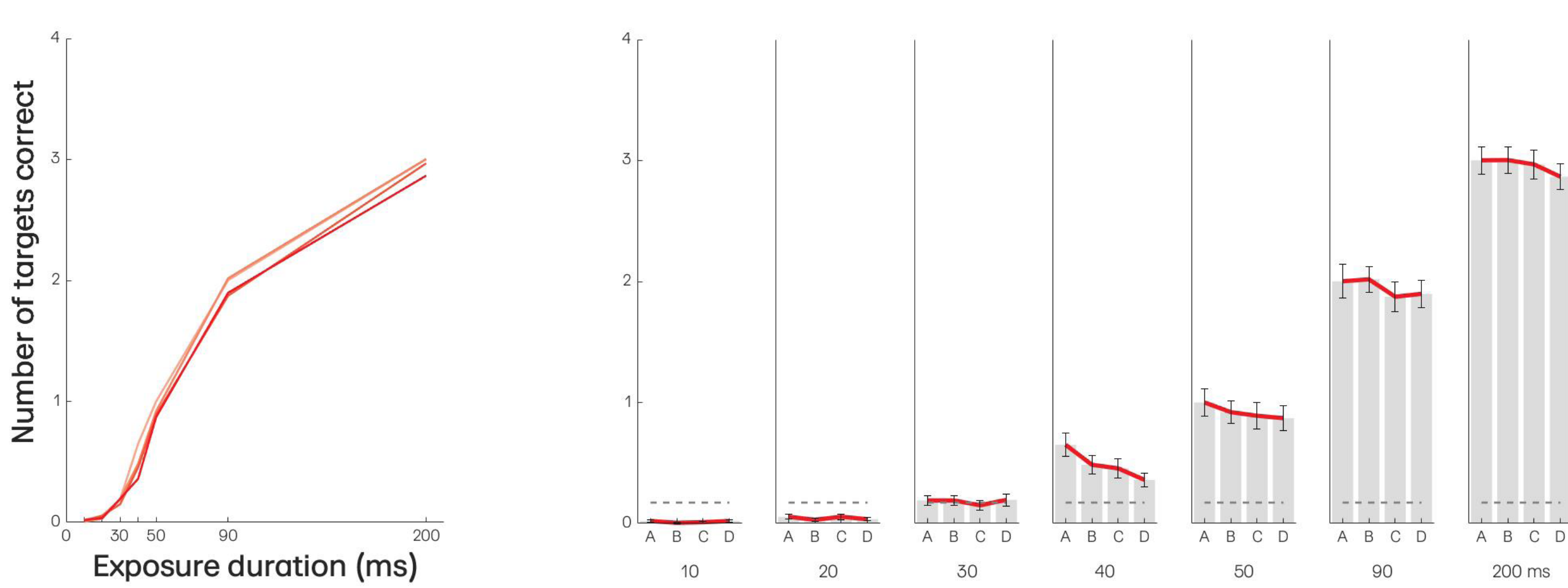
· same extenders length
· varying x-height



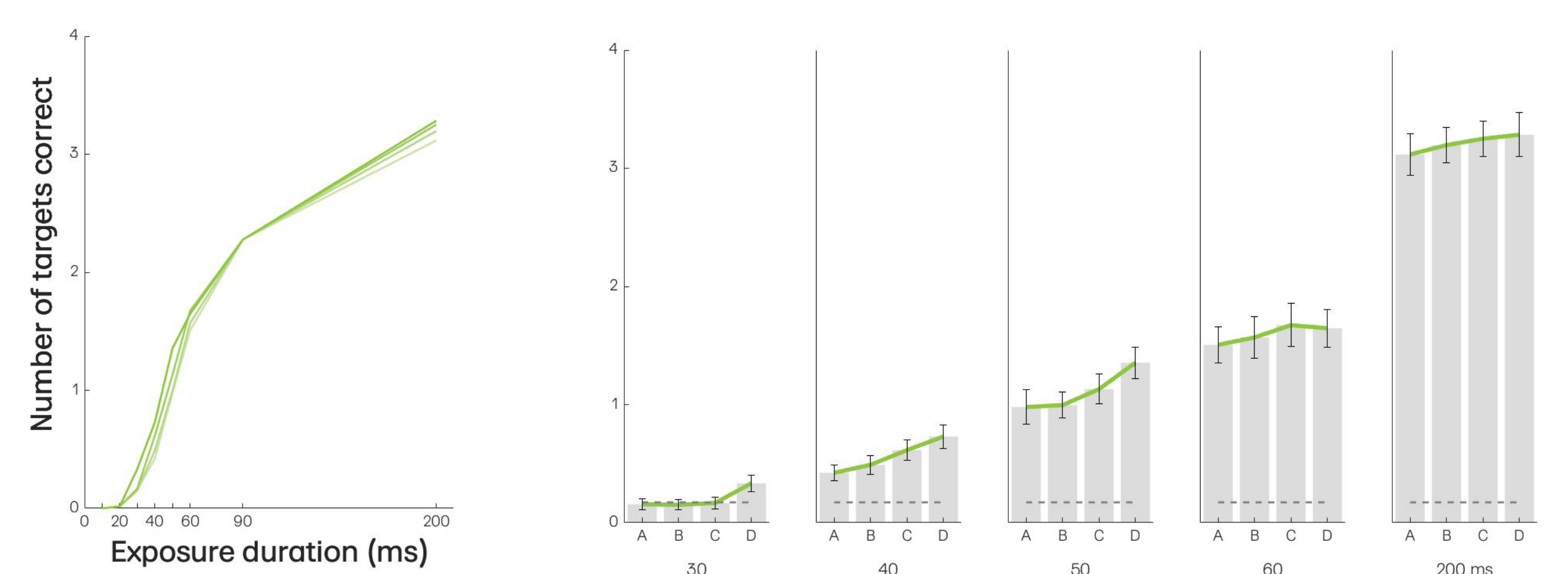
Method

In three experiments (n=26, n=12, n=12), we assessed x-height fraction, absolute x-height, and ascender/descender length impact on a whole-report paradigm. The Theory of Visual Attention (TVA) modeled participants' perceptual thresholds, processing speed, and Visual Short-Term Memory capacity.

Experiment 1



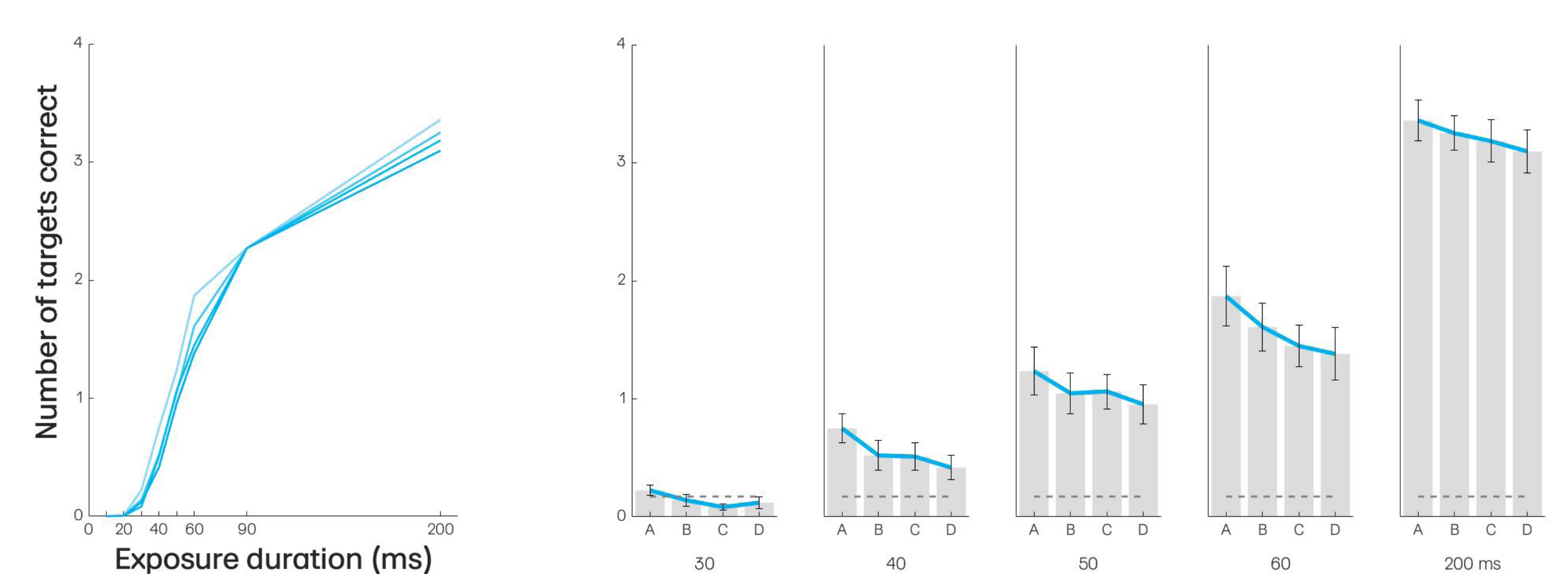
Experiment 2



Results

Letters with ascenders/descenders are recognized correctly more often than letters without ascenders/descenders. Increasing a font's ascenders/descenders length significantly improved letter recognition, but this positive effect was limited to only half the letters in the alphabet. Increasing the font's x-height improved letter recognition, and this effect applied to all letters in the alphabet. When both effects co-occur (i.e., in a font's x-height fraction), the latter effect was dominant, and yielded a positive effect on the participants processing speed in favor of fonts with larger x-height fractions.

Experiment 3



Conclusion

Our study confirms the significance of a font's x-height for legibility. To enhance legibility, typographers can modify x-height fraction or ascender/descender length. Considering processing speed, focus on x-height fraction is crucial in time-sensitive contexts like traffic signs, vehicle displays, or for readers with conditions affecting processing speed.

