The word length effect in virtual hemianopia, real hemianopia, and alexia
Claire SHELDON, Mathias ABEGG, Alla SEKUNOVA, Jason JS BARTON
Human Vision and Eye Movement Laboratory, University of British Columbia, Canada; Department of Ophthalmology University of Bern, Switzerland

INTRODUCTION:
Word-length effect = time taken to read a word correlates with numbers of letters
Perceptual rather than linguistic variable
A hallmark of pure alexia
Most of these subjects also have right hemianopia
Right hemianopia per se slows reading

QUESTION: How much of a word-length effect can be caused by hemianopia alone?
Definitive conclusions are difficult to obtain from hemianopic patients:
How can you be certain that extrastriate damage is not compounding effects?

STRATEGY:
Study virtual hemianopia in healthy subjects with a gaze-contingent technique

METHOD:
13 adult subjects
Eyelink 1000 (1000 samples/sec)
NEC Multisync monitor (140Hz refresh) maximum lag time of 7.1ms.
Display – 140 words of 3-9 letters of similar Kucera-Francis frequency
Size: 1 letter occupies 1.5° space
1 word shown at a time
Read word aloud:
Analyze - verbal onset latency - number of fixations
3 viewing conditions:
• full field
• complete right hemianopia
• complete left hemianopia

RESULTS:
1. WORD-LENGTH EFFECTS:
MEANS
full field – 14.2 ms/letter
right hemianopia – 37.7 ms/letter
left hemianopia – 31.4 ms/letter
ANOVA – hemianopias > full field
Right hemianopia = left hemianopia
95% PREDICTION INTERVALS:
full field = 51ms/letter
right hemianopia = 161 ms/letter

2. WORD-LENGTH EFFECT VS MEAN READING TIME:
CORRELATIONS (panel A):
full field r = .36, p = .20
right hemianopia r = .68, p < .008
left hemianopia r = .77, p < .002

From reports in the literature, a similar relationship is seen for cases of pure alexia r = 0.93, p < .0001 (panel B)

APPLYING THESE CRITERIA TO REAL PATIENTS:
Six paradigmatic patients:
TA, MI = hemianopic dyslexia (without left fusiform lesions)
SD, CP = pure alexia (with left fusiform lesions) WITHOUT hemianopia
CJ, AK = pure alexia (with left fusiform lesions) AND hemianopia

CONCLUSIONS:
• Hemianopia alone can create a moderate word-length effect
• Upper limit for the right hemianopia word-length effect = 161 ms/letter
• Need separate criteria for word-length effect indicating pure alexia:
  Without hemianopia: >51ms/letter
  With hemianopia: >161ms/letter
• Mean reading time highly correlated with word-length effect.
• Logically, this is not necessarily a given - in alexia with agraphia, a linguistic disorder, mean reading times are prolonged without a word length effect.
• Mean reading time may be a redundant variable in perceptual reading disorders.