

AUDITORY AND VISUAL EFFECTS ON VISUAL ATTENTION AND ON COMPREHENSION OF ELECTRONIC MAGAZINES. STUDY WITH EYE TRACKER TECHNOLOGY

Bing Zhang (1) Elena Añaños (2) Min Zhang (3)

(1) Department of Journalism and Communications Studies (2) Department of Advertising, Public Relations and Audiovisual Communication (Spain) (3) Department of Publishing and Art Design - University of Shanghai for Science and Technology (China)

Abstract

Digital reading has become an important means of reading, but the visual process for digital and paper reading are different. With eye tracking technique, orthogonal design and regression model, this paper want to analyzed audiences' eye movement when reading Chinese e-magazine under visual and auditory stimulations. An experimental e-magazine was created and 80 graduate students (40 men and 40 women) were randomly selected. All participants underwent the same setup but under different stimuli; they had to read short sentences while an eye tracker records their eye movement; after completion, participants answer a comprehension questionnaire.

Hypotheses

1. Fast-paced rhythm of the background music negatively affects reading efficiency.
2. Special visual effects have a positive effect on reading efficiency.
3. Inserted picture related to the text has positive effect on the early recognition of its content.
4. Text dubbing has a positive effect on the processing time of the contents.
5. Visual stimulation and auditory stimulation have an integral impact on the comprehension of e-magazines' content.

Results

No significant differences between genders

Neither speed of the rhythm of the background music nor the special effects have no significant effect (p=.873; p=.416) on reading efficiency (fixation count):

Variables	N	Average	Standard D.	Sig. Level (P)
C: Music fast	120	167.31	78.63	.873
slow	120	168.96	81.02	
D: Snow yes	120	172.33	78.19	.416
no	120	163.94	81.24	

Source: Authors

The kind of the Insert picture have no significant (p=.098) effect on its early recognition:

Variable	N	Average	Standard D.	Sig. Level (P)
D:Picture Related	85	40.63	4.73	0.984
Unrelated	78	40.77	5.21	

Source: Authors

Reading voice has positive significant effect (p=.050) on average gazing duration, which decrease in this situation:

Variable	N	Average	Standard D.	Sig. Level (P)
Reading voice yes	120	0.21	0.25	*.050
no	120	0.30	0.29	

Source: Authors

Regression model

$$Y = 44.079 + 19.907 * X2 - 10.220 * X1$$

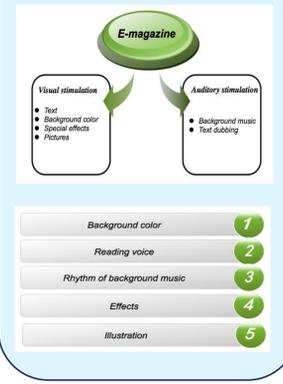
The regression model suggests that the text dubbing (X2) and the background color have a significant effect on COMPRENSION RATE. When the text dubbing X2 = 1, which means with text dubbing, it will have a higher comprehension rate; when the background color is cool X1= 0, it will have a higher comprehension rate. Then comes the CONCLUSION that with text dubbing and cool background colors, the dissemination effects of the electronic magazine are better.

model	Non-standardized coefficient		Standardized coefficients		t	Sig.
	B	Standard error				
(Constant)	44.079	3.312			13.309	** .000
X2	19.907	3.825	.311		5.205	** .000
X1	-10.220	3.825	-.160		-2.672	** .008

Source: Authors

Methodology

INDEPENDENT VARIABLES

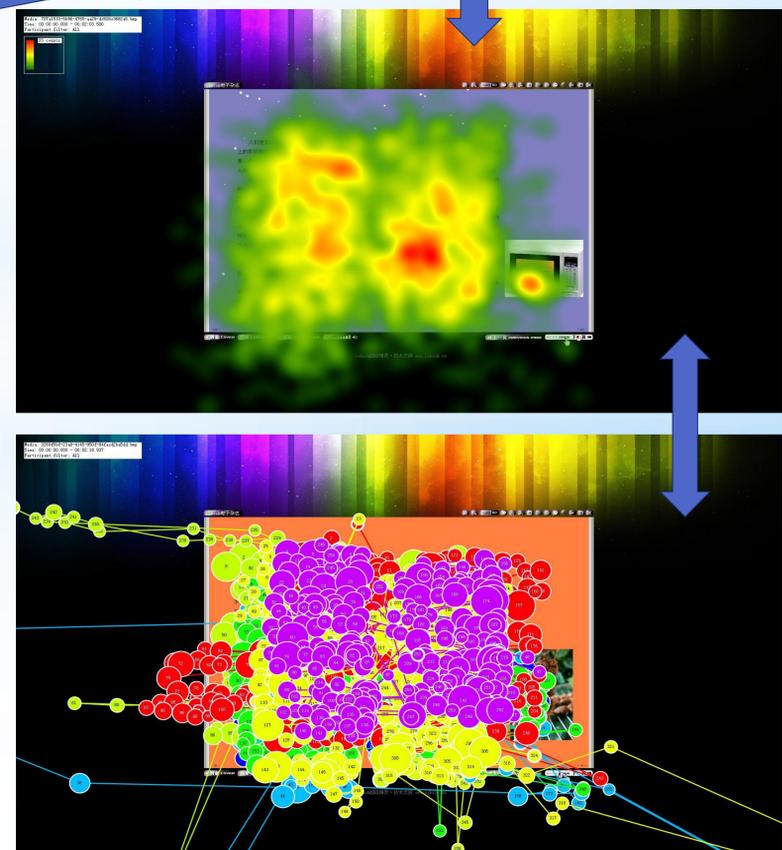
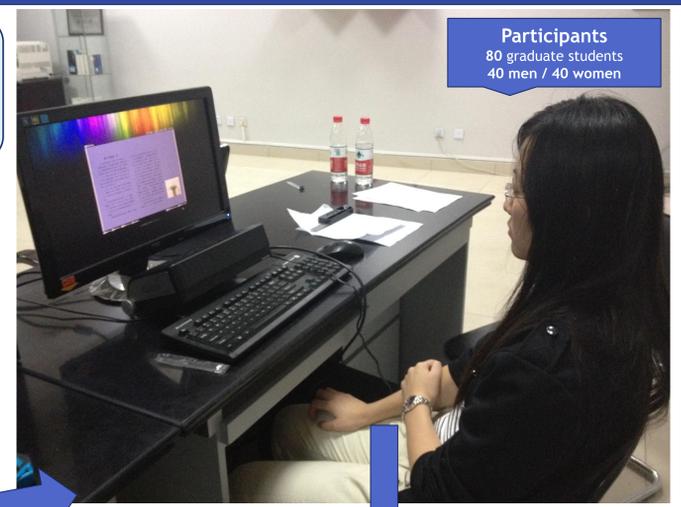


DEPENDENT VARIABLES

Eye tracker Results: FIXATION COUNT (sacade distance), FIRST FIXATION DURATION (recognition), GAZE DURTATION
Reading Comprehension

Orthogonal design

STIMULUS	VARIABLES				
	A	B	C	D	E
1	cool colors A1	without reading voice B1	fast C1	with effects D1	related to the text E1
2	cool colors A1	without reading voice B1	slow C2	without effects D2	unrelated to the text E2
3	cool colors A1	with reading voice B2	fast C1	without effects D2	unrelated to the text E2
4	cool colors A1	with reading voice B2	slow C2	with effects D1	related to the text E1
5	warm colors A2	without reading voice B1	fast C1	with effects D1	unrelated to the text E2
6	warm colors A2	without reading voice B1	slow C2	without effects D2	related to the text E1
7	warm colors A2	with reading voice B2	fast C1	without effects D2	related to the text E1
8	warm colors A2	with reading voice B2	slow C2	with effects D1	unrelated to the text E2



Conclusions

The speed of the rhythm of the background music doesn't affect the reading efficiency in terms of number of fixations.

- The special visual effect doesn't affect the reading efficiency, so adding variety of special effects in the electronic magazine will not affect people's reading efficiency.
- Reading voice has a significant effect on the average gaze duration, as means on the processing time of the contents. Adding text dubbing to the e-magazine makes the reader follow the rhythm of the voice to read.
- Text dubbing and background colors have a significant effect on reading comprehension, so with text dubbing and cool background colors, the accuracy rate is higher.

Some References

Añaños, E. (2011). Visual impact and eye fixation of non conventional advertising (NCA) on television among young people and the elderly. *Quaderns del CAC*, 37(2), 77-88.

Zhang, B. & Añaños, E. (2014). Study on eye tracking technique: do digital media influence reading comprehension? In J. Sierra & F. García-García (2014), *Tecnología y narrativa audiovisual*. Madrid: Fragua, 525-540.

Yuan, Z. & Zhang, M. (2011). Eye tracking analysis of Mobile newspaper advertising. *Science, Technology and Publication*, 8(8), 8-71.