The effects of kinetic typography on readability

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Abstract

This online-based experiment was designed to explore the effect of animated, or "kinetic" type on comprehension of a text. Subjects were shown five different ambiguous sentences, each using a different kinetic principle, such as size variation and local movement. They were then asked to choose which meaning they felt was more likely. We hypothesized that having a kinetic emphasis on a specific noun would sway subjects to select that as being related to the verb.

We found that kinetic typography has the ability to sway subjects' responses to a particular answer when that answer makes logical sense. Although all sentences we used had two nouns possibly playing the active role, subjects told us that they still would have chosen the logical answer even if the other noun had been kinetically emphasized.

Introduction

Print is dead.

Kinetic typography is a new field of motion graphics that uses animated words to illustrate concepts. The additional elements of time and motion provide opportunities that enrich the current advances made in expressive typography. Its primary commercial use is for titles design at the beginning of films, television commercials, and music videos. Suguru Ishizaki (1996) of the School of Design at Carnegie Mellon University is currently advising work on kinetic typography that illustrates a narrative without the aid of images or illustration. These are commonly either sequences of words or voiceovers with words pulled out for emphasis.

There are many rules of thumb for kinetic typography, such as the filmmaking rule of displaying text for twice the amount of time necessary to read it. However, there has been no formal experimentation to empirically conclude whether certain forms of kinetic typography are more effective in illustrating concepts.

Methods such as global movement were beyond the scope of this experiment as are many variables involved in motion such as direction and speed. We also chose not to explore emotion due to the vastness and unpredictability of the topic.

Method

Participants

Around 2/3 of the participants in this experiment were enrolled in 85-211 Introduction to Cognitive Psychology at Carnegie Mellon University. The rest were other students from the Carnegie Mellon student body.

Materials and stimuli

The experiment consisted of three kinetically animated sentences and two controls, all developed using Macromedia Flash 4. Subjects viewed the experiment on Internet Web browsers. After seeing each sentence, the browser's display switched to a question regarding the sentence just displayed. The question was displayed using HTML and standard form conventions, something that we assumed all subjects were familiar with.

Procedure

After being completely revealed, sentences were kept on the screen without kinetics for one second. The instant the question was displayed, the timer began measuring the time needed to answer. The timer was stopped the instant the subject clicked on the "Next" button to advance to the next sentence. This assumes that subjects will take roughly the same amount of time to move the mouse cursor from the selected answer to the "Next" button.

Results

T-tests for time/kinetics (from Minitab output, edited to show relevant data):

For each test, "Kinetic" indicates the answer corresponding to the kinetically emphasized word in the sentence, except for questions 2 and 5, which were the control questions.

Summary of the data, and averages of the two answers:

	Question 1	Question 2	Question 3	Question 4	Question 5
Non-Kinetic					
Number	50	34	17	8	46
Mean	5.57	4.11	4.45	3.95	3.57
St. Dev.	3.88	2.67	2.86	4.08	2.11
Kinetic					
Number	17	33	50	59	21
Mean	8.95	5.03	4.91	3.23	4.34
St. Dev.	9.37	3.14	4.08	2.24	2.55
Averages					
Mean	7.26	4.57	4.68	3.59	3.955
St. Dev.	6.625	2.905	3.47	3.16	2.33

Questions 2 and 5 are control questions, so no word was kinetically emphasized. In these cases, the "Non-Kinetic" and "Kinetic" answers are simply the first and second answers to the question.

Analysis

Those who chose the more commonly chosen answer often took less time to do so. The first question was interesting, as most people did not choose the emphasized answer, but those who did took an relatively long time to do so. This seems to show that in order to respond with the less logically plausible but kinetically emphasized answer (the man falling down the steps, not the ball), they spent time breaking down the activation to the other answer.

The controls (questions 2 and 5) had tighter distributions. The standard deviation for these two questions was lower than for that of the other questions, which leads us to believe that people were less swayed due to lack of kinetics and chose quickly. This is

supported by the fact that the answers to the two controls were more evenly spread than in the other questions. In question 2, the first control, the number of people answering each response are almost exactly even (34 to 33).

The data seems to suggest that the kinetic typography did cause a change in the subjects' choices. The data in the control cases was more randomly distributed than in the kinetic cases. However, the data also shows that the kinetically emphasized answer was not necessarily the one that was chosen. In the first question, most people chose the answer that was not emphasized. This may have been due to the sentence not being ambiguous enough, the type of kinetic typography used on the emphasized word, or the effect of initially learning how to do the experiment.

Finally, we tested to see if there was any correlation between the answer for the first trial and those of the remaining trials. We felt that there was a possibility that people who chose the kinetic answer the first time may have been more likely to choose the other kinetic answers as well due to perceived expectations. To test this, we performed a regression analysis on the data. We tested the correlation between the answer to the first question and the answers to the third and fourth questions — the two that were not controls. The following is the Minitab output produced:

The regression equation is
Q3Kinetic = 0.220 + 0.133 Q1Kinetic

Predictor	Coefficient	St. Dev.	T	P
Constant	0.22000	0.06192	3.55	0.001
Q1Kinetic	0.1329	0.1229	1.08	0.284

S = 0.4379 R^2 = 1.8% R^2 (adjusted) = 0.3%

The regression equation is
Q4Kinetic = 0.920 – 0.155 Q1Kinetic

Predictor	Coefficient	St. Dev.	T	P
Constant	0.92000	0.4554	20.20	0.000
Q1Kinetic	-0.15529	0.9040	-1.72	0.091

S = 0.3220 R^2 = 4.3% R^2 (adjusted) = 2.9%

There was clearly no relationship between these answers. The first question barely related at all to the answers from the third and fourth, with R^2 values of 1.8% and 4.3%. However, the first question may have been an anomaly because most people did not answer the way we expected, possibly due to first-time exposure to the experiment. We then tested the correlation between the third and fourth question, which were both answered in the way we expected (most people selected the kinetically emphasized answer). The Minitab output from this regression is shown here:

The regression equation is
Q4Kinetic = 0.880 + 0.0024 Q3Kinetic

Predictor	Coefficient	St. Dev.	T	P
Constant	0.88000	0.04656	18.90	0.000
Q3Kinetic	0.00235	0.09243	0.03	0.980

S = 0.3292 R^2 = 0.0% R^2 (adjusted) = 0.0%

Again, with R^2 values of 0.0%, there appears to be no correlation between the two answers.

Discussion

One purpose of kinetic typography is to combine the features of spoken and written words. Spoken words have rhythm, pitch, loudness, and tempo, whereas written ones have only their connotations and the reader's own interpretations to rely upon.
Our results show that people are, in fact, drawn to meanings accented by kinetics. Bias toward a desired interpretation can be fostered, and therefore comprehension of a text can be made more universal. Although subjects required more time to respond to sentences with kinetic effects, such lag time is acceptable in order to achieve accurate, consistent communication.

The experiment's results could be further validated if we made a number of structural changes to it. For instance, we could rearrange the order in which sentences are shown for each subject. Provided this arrangement is random, we would significantly reduce the effect of learning new methods of visualizing meaning and answering questions over time.

We may also have prevented a few invalid data points by being present while subjects perform the experiment. Many subjects may not have understood that response time was also being measured, as some took as long as 37 seconds to answer. When observing subjects complete the experiment, we noticed that very few actually read the instructions. Reading these instructions aloud, or — better yet — making them kinetic themselves, could have prevented this problem.

First running the sentences in a pilot test to determine ground-state interpretations may have reduced the effect of contextual bias in the kinetic sentences. For instance, some subjects told us that the sentence "she couldn't use the screwdriver to fix the lamp because it was broken" does not make sense unless the screwdriver — not the lamp — was broken. Therefore, although "screwdriver" was stressed using animation, that may not have been the reason subjects chose it, as selecting "lamp" is counterintuitive. We could have converted the proportion of subjects selecting the more "logical" answer into a factor by which to multiply the number of responses received for the kinetic versions of the sentences.

Finally, we discovered that many subjects first selected an answer and then changed their minds by clicking on the other option. This data was not measured in our experiment, but in a future iteration, it may provide more insight into subjects' decision process.

References

Bork, A.(1983). A preliminary taxonomy of ways of displaying text on screens. Information Design Journal. Vol.3 No.3. pp.206-214.

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Mills, C. and Weldon, L. (1987). Reading text from computer screens. ACM Computing Surveys, Vol.19 No.4. pp. 329-358.

Additional information on kinetic typography is available at:
http://www.cmu.edu/cfa/design/kdg/kt/

Appendix

The experiment was conducted online at http://blake.res.cmu.edu/experiment (available until 12 May, 2000). Since this was a test of kinetic typography it is not represented well in this document and should be experienced personally. However, attached are some screen shots of one kinetic piece along with its question.

0.5s

1.75s

2.0s

2.25s

4.0s

6.0s