Flip Animation Sign

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Introduction:

Studies on ways to improve attentiveness with imagery signs have revealed that dynamic imagery increases a viewer's attentiveness, and even better with animated images [1] [2]. This project aims to create a new effective animated imagery road sign that overcomes the problems of the current digitally animated imagery signs, which include distraction caused by the brightness of the LED lights, large energy consumption, and expensiveness [3]. The study hypothesizes the problems to be solved if the imagery of the road signs can be animated without any digital display, and tests a proposed method to do this, which is to create a Flip Animation Sign, an automatically rotating large mechanical flip sign that is powered by a motor and programmed with an arduino to display a series of slides with warning sign images that subtly change so that when flipped through, the slides create an illusion of road sign icons moving and acting what it is warning the driver about.

Figure 1. Examples of non-dynamic imagery compared with dynamic imagery.

Objective:

The goal of the Flip Animation Sign Project was to prove that it is possible to create a low cost, energy-efficient, and non-distracting animated road sign without using a digital display and LED lights to overcome the drawbacks of the current digitally animated imagery signs, as well as the benefits of integrating a primitive form of animation to improve the effects of warning signs. It was hypothesized that the Flip Animation Sign would catch the attention of the viewer/driver more than regular static signs and be more effective. The outcomes were valuable in proving the importance of dynamic stimulus in road sign imagery, and exploring further possibilities to improve signs that play an important part of everyday life.

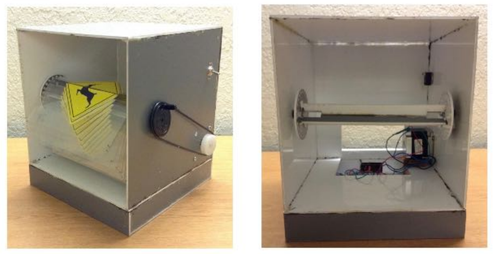

Figure 2. Constructed Flip Animation Sign.

Methodology:

- The Flip Animation Sign was constructed (Figure 2) so that it had the same mechanism as a mechanical flip book, except a stepper motor will make it operate automatically, and it is made programmable and controllable with an arduino in order to make the flip animation stop at any specific slide. A total of 4 different Flip Animated road were derived from 4 selected currently existing static warning signs, shown in Figure 3. Figure 4 shows stills of the Flip Animated steep hill warning sign that was made.
- An online evaluation experiment of the Flip Animated road signs containing two tasks was completed by a total 47 participants. The results pertaining to the Flip Animated warning signs were compared to results pertaining to regular static versions of the warning sign.
  - Task 1 collected realistic reaction time using a short driving video simulation from a first-person (driver's) perspective.
  - Task 2 measured the perceived risk that the Flip Animated road signs suggested using a series of surveys.

Figure 3: Static images of the 4 types of signs that will be made.

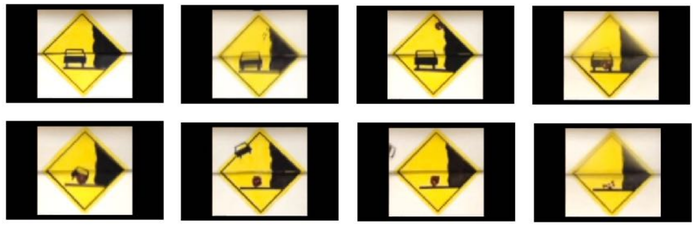

Figure 4. Eight stills of the Flip Animated steep hill warning sign.

Reaction Times After Flip Animated Sign Appearance:

	Falling Rocks (ms)	Steep Hill (ms)	Deer Crossing (ms)	School Crossing (ms)
AVG:	6715.5	5465.210526	5453.230769	9666.117647
MIN:	4369	261	268	49
MAX:	9834	11571	11497	17242
N:	10	19	13	17

Reaction Times After Still Sign Appearance:

	Falling Rocks (ms)	Steep Hill (ms)	Deer Crossing (ms)	School Crossing (ms)
AVG:	5383.727273	6904.230769	3302.538462	9945.176471
MIN:	2702	1367	554	536
MAX:	7965	10949	6644	23759
N:	11	13	13	17

P-Value:

	Falling Rocks Signs	Steep Hill Signs	Deer Crossing Signs	School Crossing Signs
P-value from T-Test	0.088190071	0.1481961943	0.03322410209	0.9084858441

Table1. Results of the reaction times from task 1.

Results:

The Flip Animation Sign did not have faster reaction times and higher perceived risk than the static signs as hypothesized. All p-values from non-related t-tests were greater than the cut off point of 5%, meaning there was no statistical difference between the data sets of flip animation signs and the data sets of regular still signs. However, there were no real indicators that said the Flip Animated signs were distracting because the participants all answered correctly when asked what each flip animation sign expressed, so none of the flip animation or designed images made the meaning of the sign incomprehensible.

Conclusions:

Imagery road signs play an important part of road safety and can always be improved to enhance the viewer's attentiveness and safety, and be enjoyable to looking at. The Flip Animation Sign's attractive animation using the early motion picture device of flipbook animation gave the viewer the moment to stop and slow down in the fast paced world to look at it. Although there were no statistically great benefits, the Flip Animated road signs was shown to be fun to see, and its function proved that art can be applied to more functional, everyday things as well.

References

[1] L. Can, A. Krishna, and R. S. Elder, "A Sign of Things to Come: Behavioral Change through Dynamic Iconography," *Journal of Consumer Research*, vol. 41, p. 1427, Apr. 2015.

[2] J. Pratt, R. A. Abrams, and P. V. Radulescu, "It's Alive!: Animate Motion Captures Visual Attention," *Psychological Science*, vol. 21, pp. 1724–1730, Oct. 2010.

[3] T. Greene and A. Valentini, "Wide Format Print vs. Digital Display – Part 1," *Info Trends*, pp. 1–10, Dec. 2013.