Research Life Natura Road Signs Production and Efficiency

This research intends to create and study how road signs could be improved through the use of applied neuroscience.

Research Background

Vehicle traffic is an important cause of mortality and a threat to the conservation of biodiversity. This phenomena has been growing steadily in recent years. A significant number of animal species belonging to different groups are endangered by vehicular traffic. How to evaluate the effectiveness of road signs for the protection of wild animals?

Research Objectives

This research has been designed and developed to monitor how the drivers acquire and understand the information displayed on the road sign prototipes. The main goal of this research is to measure and verify which road signs, specifically created, are more effective and efficient. The main research questions are:
- Which creative hypothesis is more effective?
- Which communication objects don't work?
- Is my message understood as I would like?
- Does the overall message achieve its purpose?
- How can I improve the creative hypotheses?

Methodologies

The choice of the most effective methodology depends on the objectives to be achieved. In order to evaluate the efficiency and effectiveness of a stimulus (creative hypothesis) it is necessary to measure it when it happens, when subjects are exposed to stimuli.

A stimulus is effective when, on a perceptual - cognitive level, information included in it are read according to an univocal order with a sufficient time to be understood by the brain in a easy, very memorable and engaging way.

We use neuroscientific tools coupled with traditional methodologies: we want to give a

complete meaning to people's experience.

Eye-tracking

Eye-tracking records eye movements, measuring the corneal reflection through infrared light. It allows to know:
- what a person is looking any time
- how this person collects information that will be elaborated by brain
- how many time this person lingers on details

It helps us to understand which strategies are the most quick, immediate and incisive

EEG Electroencephalogram

EEG records changes in electrical potential generated by brain. It allows to measure when people:
- are attentive
- memorize
- refer to knowledges that are already present in memory
- struggle to elaborate information

It helps us to understand which contents are easy and coherent depending on predetermined aims.

Post test Qualitative Interview

It is the tool used to deepen people's experiences and the meaning they give to them. It is essential to:
- examine the drivers at the bottom of people's choices
- understand their opinions: what people think about a concept/theme and how they tell about this concept with the others (word of mouth)

Joint to Eye-tracker and EEG, it allows us to recreate all the experiential flow and to understand how to make the communication easy and direct.

Nello specifico ogni domanda di ricerca viene risposta combinando l'uso delle metodologie come espresso nella seguente tabella.
In particular, each research question is answered by combining the use of methodologies, as expressed in the following table.

Objective	ET	EEG	QL INT
Which creative hypothesis is more effective?	V	V	
Which communication objects don't work?	V	V	V
Is my message understood as I would like?			V
Does the overall message achieve its purpose?		V	V
How can I improve the creatives hypotheses?	V	V	V

Research field

The creative hypotheses have been designed in 4 versions that follow different communication strategies. They have also been adapted in the 4 target languages according to the project.

Every Creative Hypothesis has been shown, in full screen, approaching. The 1-3 phases recreate the sequence of vision like a real ambientation. Phase 4 is a fullscreen image useful for checking the objects' visibility and cognitive perception. Between one creativity and another there were ads to distract the sample. The viewing order has been in programmed rotation to avoid the "order effect".

The test was conducted in Italy, with a sample of 32 native speaking participants, owners of driving licences; they usually use the car for trip:
- 8 Italian (4 Men and 4 Women)
- 8 Spanish (4 Men and 4 Women)
- 8 Greek (4 Men and 4 Women)
- 8 Romanian (4 Men and 4 Women)

All the participants were exposed to all the stimuli.

Main results

The green frames highlight the best Creative Hypotheses, the yellow one the second:
- 2_Car Creative Hypothesis is the best because it reaches a good cognitive performance (EEG metrics) and a sufficient visual performance (Eye-tracking metrics)
- 4_Crossing Creative Hypothesis is the second classified because it has a good visual performance (Eye-tracking metrics) and a sufficient cognitive performance (EEG metrics)

3_Morgue is not to be considered as an acceptable creativity while 1_Silhouette only for the Romanian language. 2_Car and 4_Crossing are the ones that perceptively perform best. We need the results of the interviews to discriminate between different creative proposals.

Spontaneous recall

| Creat. Hp. Recall	1st position	2nd position	3rd position	4th position	Weighted Total
Silhouette	4	2	1	0	5,9
Car	8	2	1	1	10,1
Morgue	5	2	1	0	6,9
Crossing	10	2	2	1	12,6
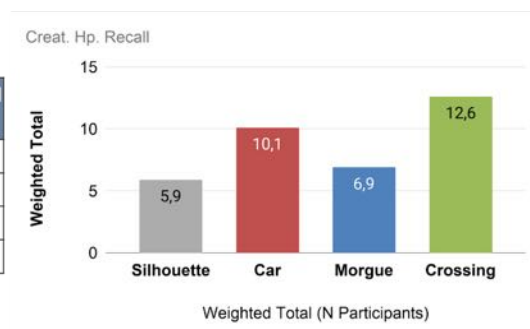
The result shown in the summary of the approach phases 1-3 are strengthened by the

spontaneous recall in the interview, where 4_Crossing and 2_Car Creative Hypotheses reach the best performances. In particular, the participants have mentioned the 4 Creative Hypotheses in different positions as shown in the Table. The most memorable Creative Hypothesis is 4_Crossing, followed by 2_Car.

Ranking these creative hypotheses against how intuitive they are (at the most intuitive 1, at the least intuitive 4)

Most intuitive Creat. Hp.	1st position	2nd position	3rd position	4th position	Weighted Total
Silhouette	5	7	11	9	17,2
Car	20	7	4	1	27,1
Morgue	5	12	8	7	18,8
Crossing	2	6	9	15	13,7
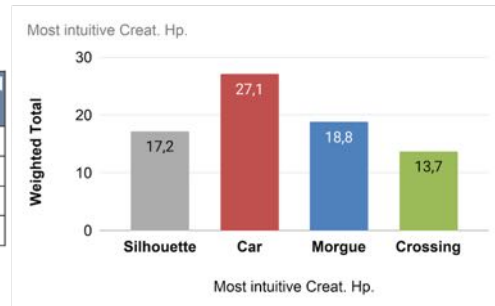
According to interview, 4_Crossing is considered by participants less intuitive and less effective than 3_Car. Both communications can be improved by modifying certain aspects as indicated by the following observations.

How to improve 2_Car

2_Car Creativity has the best EEG response, but visibility can be improved.
- Visibility effort can be decrease separating communication objects (Car from the animal).
- The bear's snout must be more marked and the car damage more recognizable.
- The car could be put into perspective to accentuate the signs of damage.
- Texts should be bigger and contrasted to balance the composition.
- The dynamics of the accident should be more realistic.
- During the Interview people explained that the elements of the Car Creative Hypothesis aren't composed in the right way (colors, car, accident dynamics…). Only the animal is killed in the accident, the driver and any passengers are not seriously injured.

The Message: the emotional impact of the 2_Car Creative Hypothesis is negative and strong. You see the wild animal dead because of you, because of the speed driving. People report sentiments of pain and suffering for the animal dead. It's a raw picture.

How to improve 4_Crossing

4_Crossing Creative Hypothesis has a good visibility performance, but not its EEG reaction.

- Visibility and Fixations time are good because the main figure is easy to identify: the image is contrasted and with a lot of fixation points.
- Scene has to be better contextualized to make attention grow: the bear could look directly into the camera showing that he is realizing the imminent collision.
- The contrast of the claim on the green background and the animals on the grey of the road works.
- Improve the identification of the bear cub.
- Communication can be improved by working on visibility and readability: it may be sufficient to enlarge the animal family and split the text. For example "Vivo o muerto" at the top and the rest at the bottom.

The message: the impact of the 4_Crossing Creative Hypothesis is quite positive. This Creative Hypothesis has a better emotional impact on the participants: it has a positive message! The image represents a concrete and real situation: wild animals crossing the road in a forest. Some participants experienced this situation and wild animals with puppies are tender. You have to be careful and slow down to protect them.