

## *Improving traditional tourism promotion through the application of sensory branding*

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### *Abstract*

In an attempt to increase the small persuasive power of tourism promotion on consumers, the influence of sensory branding has been explored and monitored by electroencephalographer (EEG device). Combination of promotional technique and sensory branding can significantly increase the positive impact on potential tourist during making the decision process about destination chose. The starting point of this research is the fact that tourism promotion affects the destination choice of future tourists only with 8% (Travelsat, 2011). With the aim to reveal the impact of sensory branding on the future tourists, organized a neuromarketing research using electroencephalographic scanning of the participants, to explore the extent to which sensory branding can increase the impact of promotion on consumers. A comparison of statistically structured results gives an answer to the question of the extent to which this form of promotion influences the behavior and decision-making of consumers.

Keywords: Sensory branding, promotion, tourism, EEG, neuromarketing.

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### *Introduction*

Sensory branding is a technique of using all five human senses in communicating with consumers, is based on the assumption that this way marketing companies will reach a far higher level of influence than traditional marketing. Hulten Sensory Branding defines as a type of marketing that affects all senses, creating so emotional associations with consumers, ie marketing techniques that aim to seduce the consumer using his senses, and thus affect his feelings and behavior (Hulten, 2011, p. 256-273). Therefore, sensory branding builds a relationship with consumers by combining modern technology and the impact on the consumer's mind. With the use of new technology, it is possible to create exceptional sensory experiences for consumers, such that they have the impression of a science, a fantastic journey. Such is the new Teleporter 4D technology that uses Marriott hotels. With the help of the Oculus Rift technology, hotel guests were able to virtual visits to destinations in Hawaii, with the feeling that they were physically teleported to a beautiful beach. A Teleporter user can feel the atmosphere of the environment, with

*Neuromarketing experiment, materials and methods*

With the aim to reveal the impact of sensory branding on the future tourists, organized a

neuromarketing research using EEG scanning of the participants. In total, 105 examinees were subjected to EEG surveillance. All the respondents of the EEG part of the research were carefully presented and explained the conditions and details for carrying out the research.

Respondents were asked to state that they were free from neurological diseases (ie. epilepsy), that they were not under the influence of alcohol, narcotics or medicines that could impair attention, cause drowsiness or similar side effects. Then they expressed their opinion on the dominant hand, only the right-handed took part in the study, because of the possibility of counter-lateralization of left-handed ones (Annet, 1970, p. 303-321; Bryder, 1982, p. 3) like a mirror picture, in compere with right-handed. After that, each respondent read and signed the *Consent for Participation in Research*. The EEG MITSAR 201 equipped with dry electrodes, (Dry EEG Electrode - Florida Research Instruments), was used. Active electrodes, impedances below 5 kOhm, (Harmon-Jones & Peterson, 2009, p. 170-197), are arranged in a sequence of 10/20 series, as follows: Fp1, Fp2, F7, F3, Fz, F4, F8, T3 , C3, Cz, C4, T4, T5, P3, Pz, P4, T6, O1, O2. A reference assembly was used, with a common reference on the ear mussels (A1, A2). Processing and visualization of EEG signals made by computer software WinEEG. Before of data analzsing is required a correction. It is necessary to remove the technical and biological artifacts from the raw EEG image. The signal is usually

contaminated with various sources, interference of 50 Hz of network voltage, then strong biological signals, blinking, movement of the eyeballs. The Mitsar software WinEEG provides digital EEG filtering methods, and during the scanning of the subjects we used the following parameters: speed 30 mm / sec, absolute threshold 3 mV, low cut 0.1 sec (1.6 Hz), high-frequency suppression, (high cut) 30 Hz, and a filter (notch filter), 45-55 Hz, was used to suppress the artefact of the mains voltage. Separation of the eye blink artifact from the EEG record was performed using the Independent Component Analysis (ICA) method. This prepared EEG record, using Fast Fourier Transform (FFT), enables the creation of a brain map, (Brain mappings of the frequency spectrum).

EEG surveillance was done on two occasions. During the first scan, the visual promotional material was broadcast to the respondents and using the electroencephalograph directly followed the changes in the cortex of the subjects. By completing the EEG scan, respondents rated the promotional material they saw through the offered closed response types - the Likert scale of 1 to 5, (1. Full repulsion, it irritates me to 5. I'm thrilled), including collecting basic socio-demographic data, followed by a half-hour pause.

After a pause and refreshment, the EEG recording is repeated, but with sensory branding, that is with the specific audio accompaniment of visual content and occasionally the emission of a fragrance supplement, which ensures the

participation of the respondents in the experiment ends. The computer used for broadcasting visual and audio stimulus is synchronized with an electroencephalograph's computer, so each change of stimulus is automatically recorded. This allows the researcher to have accurate real-time information, all changes, and brain responses to each given stimulus during the EEG analysis. Comparison of statistically processed results gives an answer to the question of the extent to which the promotion affects the behavior and decision-making of the investigated sample of consumers.

Promotional materials used during the projection include attractive photographs of the five destinations included in the survey, but now marked with capital letters of the alphabet. In this way, the promotion or the negative affirmation of European famous resorts is avoided. The order of broadcasting of promotional photos was determined randomly. During the experiment, brain reactions of the Beta and Alfa rhythms of the frontal and occipital cortex were monitored. Theta waves as a form of emotional reactions of the limbic sector are expressed through the changes in the orbitofrontal cortex related to acceptance, and working memory (Aftanas & Pavlov, 2005, p. 85-94), or coding of visual stimuli in long-lasting memory, associated with the left prefrontal cortex (Rositer, Silberstein & Richard, 2001, p.13-22). Then, Alpha asymmetry is monitored, in accordance with Davidson's model of hemispheric asymmetry, the Alpha rhythm of the left prefrontal cortex reflects the positive while the

right side is a negative reaction to the stimulus (Davidson, 1992: 39-43). The presence of the Alpha wave in the occipital cortex connects with reduced attention to the seen promotional material, the *idlingrhythms*, which can be interpreted as a lack of interest or a negative reaction (Feige, Schefer & al. 2004. p. 2864).

#### *Analysis and results*

Before the first EEG analysis the comparison of the electroencephalographic finding of the best-valued destination (A) with the destination in the fifth place (B), Kolmogorov-Smirnoff tests of normality done. After that, the Crombach reliability test (average inter-correlation among the item – internal consistency), was done, resulting in an alpha score of 0.734. Comparison of mean values by which promotional content was evaluated over the *t* test of paired samples shows a statistically significant difference ( $p < 0.0005$ ), between the first position A (4.1714) and the destination B (3.2381), in the fifth place, as an extremely positioned values.

The next step is to analysis the spectral power of theta, alpha, and beta rhythms A and B destination. The analysis of the brain maps of the average values of the respondents provides an image of the differences in the frequency bands and the spectral power of the signal distributed in certain portions of the cortex (Table no. 1).

From a brief description of the brain map or spectral force, a significant difference in the reaction of the participants during the exposure of

the promotional material of the destination A (positive reaction, acceptance) and destination B (the promotion is poorly accepted or rejected) is observed in most respondents.

**Brain maps description, spectral power  $\mu V^2$  (First EEG scan)**

	4-8 Hz	8-13 Hz	13-30Hz
<b>A</b>	Theta rhythm 4-5 Hz in the prefrontal cortex, as well as significant activity in the left temporal and occipital cortex, left lateralized. Low activity of the 5-6Hz, of the medial and right frontal cortex was observed, as well as strong activation of the left cortex 6-7Hz, then the prefrontal medial and right region 7-8 Hz.	Alpha range 8-9Hz, in the left prefrontal cortex, then 9-10Hz in the medial and left cortex, 10-11Hz, medial and bilateral. Range 11-12Hz present in the occipital part, right lateralized, low activity.	Beta range has no significant activity.
<b>B</b>	Very low activity in temporal 4-5Hz, and occipital part 5-6Hz.	Low activity in the occipital part of the cortex 8-10Hz, and a very strong activity of the occipital cortex, bilaterally in the range of 10-13Hz.	Low activity 13-14H in the occipital region.

**Table no. 1**

The next step is the analysis of the alpha waves of the prefrontal cortex asymmetry. In accordance with Davidson's asymmetry model, the t test for comparison of the average results of the left hemisphere electrodes (Fp1, F3, F4) of the destination A and the same side of the destination B was made (Table no. 2). Then this procedure is repeated on the right cortex with electrode Fp2, F4, F8, (Table no. 3).

All participants who highly rated destination A showed significantly higher alpha range values in both hemispheres, especially left-frontal cortex. The results of hemispheric asymmetry analysis, in all the rhythms (theta, alpha, beta), show a significantly destination A, but it is very important to determine the extent to which sensory branding can contribute

**t-test Alpha asymmetry of the left hemisphere of the prefrontal cortex**

<i>Left hemisphere Alpha</i>	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
A left hemisphere B left hemisphere	1.1033	1.45054	.19739	.70741	1.49925	6.590	104	.000

**Table no. 2**

**t-test Alpha asymmetry of the right hemisphere of the prefrontal cortex**

<i>Right hemisphere Alpha</i>	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
A right hemisphere B right hemisphere	.93630	1.46178	.19892	.53731	1.33529	4.707	104	.000

**Table no. 3**

stronger activity of the participants who have more valued destination A. This brief overview of the results of the first EEG scan ends with the Theta /

Beta ratio analysis, which high t values indicate the increased attention and emotional involvement of the respondents during the promotion of destination

A, (Table no. 4). The presented content is in the focus of attention, accepted and permanently memorized (Morillas-Romero, Tortella-Felici & Putman, 2015. p. 598-606). In the second phase of the EEG experiment, it was repeated but with sensory branding. As with the analysis of the first scan, the analysis of the spectral power of theta, alpha, and beta rhythms A and B destination is first considered (Table no. 4). The experiment focuses on detecting the magnitude of the impact of sensory branding on respondents who have opted for to the additional conviction effect of the promotional content of the lowest-placed destination B. In accordance with Davidson's asymmetry model, (as well as in the first part of the experiment), the t test

for comparison of the average results of the left hemisphere electrodes.

**Brain maps descrip, spectral power  $\mu V^2$  second scan, with sensory brand.**

	4-8 Hz	8-13 Hz	13-30Hz
A	Theta rhythm 4-5 Hz in the prefrontal cortex, as well as significant activity in the left temporal and occipital cortex, left lateralized. Low activity of the 5-6Hz, of the medial and right frontal cortex was observed, as well as strong activation of the left cortex 6-7Hz, then the prefrontal medial and right region 7-8 Hz.	Alpha range 8-9Hz, in the left prefrontal cortex, then 9-10Hz in the medial and left cortex, 10-11Hz, medial and bilateral. Range 11-12Hz present in the occipital part, right lateralized, low activity.	Beta range has no significant activity.
B	Very low activity in temporal 4-5Hz, and occipital part 5-6Hz.	Low activity in the occipital part of the cortex 8-10Hz, and a very strong activity of the occipital cortex, bilaterally in the range of 10-13Hz.	Low activity 13-14H in the occipital region.

Table no. 4

**t-test alpha asymmetry of the left hemisphere of the prefrontal cortex  
 (Second EEG scan - with sensory branding)**

<i>Left hemisphere Alpha</i>	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
A left hemisphere B left hemisphere	1.73852	1.70024	.23137	1.27444	2.20259	7.314	104	.000

Table no 5

**t-test alpha asymmetry of the right hemisphere of the prefrontal cortex  
 (Second EEG scan - with sensory branding)**

<i>Right hemisphere Alpha</i>	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
A right hemisphere B right hemisphere	.88500	1.50337	.20458	.47466	1.29534	4.026	104	.000

Table no 6

(Fp1, F3, F4) of the destination A and the same side of the destination B was made, (Table no. 5).

Then this procedure is repeated on the right cortex with electrode positioned Fp2, F4, F8, (Table no. 6). Significantly stronger Alpha band activity,

especially left brain sphere, have been shown by respondents who have highly rated destination A, and it is expected that they will better memorize the promotional material presented, (Astolfi, Fallani & al., 2008. p. 333-341; Vecchiato, Astolfi & Fallani, 2010. p. 165-179). As with the first EEG scan, the asymmetry of the prefrontal cortex is now analyzed by comparing the average values on the lateral electrodes (left: Fp1, F3, F7, right: Fp2, F4, F8) in three frequency ranges (Theta, Alpha, Beta). Significantly stronger activity of the left hemisphere of the participants who voted for the destination A in the survey confirms the credibility of the selected destination. The Alpha rhythm shows a markedly stronger activity of the left cortex, which according

to Davidson's model indicates acceptance, liking (Davidson, Ekman et al 1990. p. 330-341; Davidson, 1992. p. 39-43; Davidson & Irwin, 1999. p. 11-21). The beta rhythm expresses the increased activity of the right hemisphere, indicating increased attention and cognitive content processing (Vecchiato, Astolfi & Fallani, 2010. p. 165-179; Vecchiato, Cherubino, Trettel & Babiloni, 2013. p. 49). In the next step, (Table no. 7), the Theta/Beta ratio is analyzed (the ratio of values collected from all electrodes at the head of the respondents). The results shown indicate an increased attention and emotional involvement of the participants exposed to this combined stimulus. The beta range does not show any significant difference, which indicates a

**The relationship between theta / beta rhythm (Second EEG scan - with sensory branding)**

<i>Theta/beta ratio</i>	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Theta A Theta B	4.19852	1.73728	.35962	3.48561	4.91142	11.675	104	.000
Beta A Beta B	.20139	1.95595	.38066	-.55323	.95601	1.529	104	.598

Table no. 7

**t-test alpha asymmetry of the left hemisphere of the prefrontal cortex (I Scan / II Scan - Sensory Branding)**

<i>Left hemisphere Alpha</i>	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
A left hemisphere B left hemisphere	1.1033	1.45054	.19739	.70741	1.49925	6.590	104	.000
A left hemisphere B left hemisphere	1.73852	1.70024	.23137	1.27444	2.20259	7.314	104	.000

Table no. 8



The final step of analyzing the impact of sensory branding on respondents is a comparison of the results of the first EEG scan and the second EEG monitoring with the addition of sensor branding, red shaded values, or gray in black-white edition (Table no. 8). Hemispheric asymmetry expressed through increased left hemisphere activity ( $t=6.590$ , and II scan  $t=7.314$ ), shows satisfaction, acceptance of the presented content with a significant improvement of promotion memory during the process of its assessment (Vechiato, Cherubino, Trettel & Babiloni, 2013. p. 49). On the other hand, the hemispheric asymmetry of the right cortex is less pronounced ( $t=4.707$ , II scan  $t=4.026$ ),

which is interpreted as a consequence of the effect of sensory branding **on all** respondents. The right hemisphere is more active at all participants, as a result of increased attention, increased interest in promotional content (Ohme, Reykowska & al. 2010. p. 785-793). The indicated  $t$  values speak of the positive effect of sensory branding, but little can be said about the size of this impact on respondents. For this reason, the size of the influence of the sensory branding intervention is expressed through the eta square (Pallant, 2011. p. 246). As a result of the positive effect of sensory branding, a significant increase in the Theta rhythm of the left hemisphere was demonstrated.

**t-test asymmetry of left hemisphere Theta range of the prefrontal cortex  
 (I Scan / II Scan -Sensor Branding)**

Theta range	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
A left hemisphere I A left hemisphere II	-3.35259	2.93348	.53528	4.42623	-2.27869	-8.000	104	.000

Table no. 9

Using the formula  $Eta^2 = t^2 / (t^2 + (N-1))$  the size of the impact  $t=-8,000$  converted by the Eta square is 0,38, which means that the sensorial branding increased the acceptance of the promotion by 38%, (The resulting Eta value is multiplied by 100 and the expression is given in percentages). The value of the Alpha rhythm is also increased, the value  $t = -5,100$ , calculated over the Eta square is 0.199 in the percentages of 19.9%. Beta rhythm is increased and amounts to  $t=-3,597$ , calculated by the same procedure Eta square gives a value of 0.114 or

11.4%. The results unambiguously show the positive impact of sensory branding on respondents who have opted for first-ranked destination A. Through this research, it is proved the extent to which sensory branding can contribute to improving the convincing effect of the promotional content of the five-rated destination B? In Theta range, the value  $t = -4.453$ , calculated using the Eta square is 0.16, ie 16%, which means that the promotional material with the influence of sensor branding has increased the level of acceptance, the liking of

destination B. Comparison of the alpha rhythm of the first and second scan shows  $t=-3.675$ , over the Eta square gives the value of 0.115 or 11.5%, increasing the acceptance of promotional content.

The same procedure was used for the Beta range, so the value of  $t=-2,599$  is 0.114 or 11.4% of the increase in the promotive effect.

**t-test asymmetry of the left hemisphere of Theta range of the prefrontal cortex  
 (I Scan / II Sensor Branding)**

Theta range	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
B left hem. I B left hem. II	-.46259	.76331	.10387	-.67094	-.25425	-4.453	104	.000

Table no. 10

### Conclusion

The electroencephalographic scanning of the subjects provides various sorts of data. The researcher processes the collected information according to a predetermined criterion. The criterion for data analysis during this experiment is the reaction of each respondent to the seen promotional materials. An identical procedure was repeated during the EEG scan of the respondents using sensory branding. In all measurements, sensory stimuli induced a change in the intensity of bioelectric potentials in the hemispheres, so that

after processing and comparing the obtained data, it is entirely justified to assert the positive effect of sensory branding on respondents.

Previously presented is a fact-based evidence of the positive impact of sensory branding on respondents, that is, through the combination of promotional techniques and sensory branding, it is possible to increase the influence of tourism promotion on potential tourists in the decision-making process on purchasing a tourism product (Tanasic, 2017, p. 109-125).

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