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Experiments on Life Energy and Retrocausality

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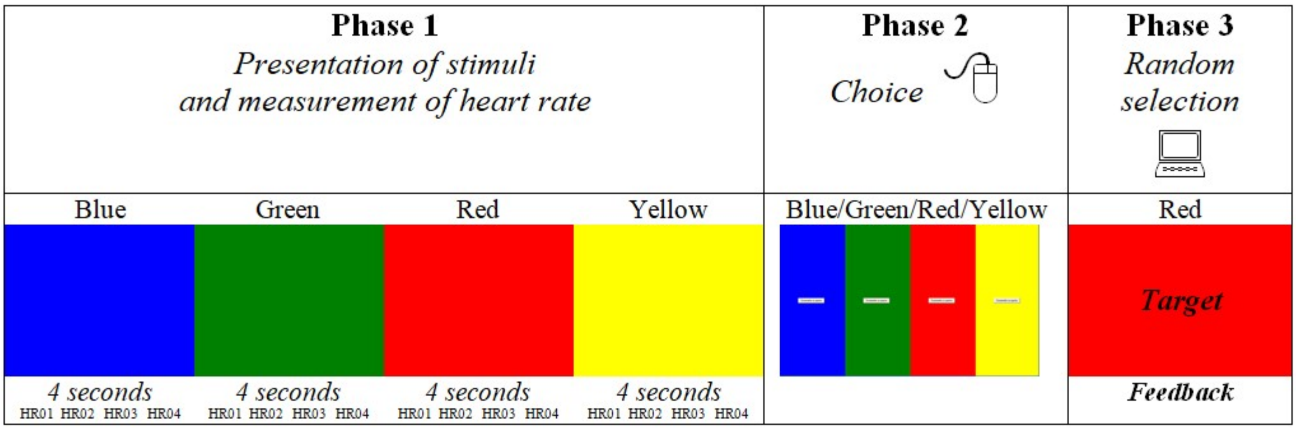
The syntropic definition of Life Energy can be translated in the following testable hypothesis: "*Since life feeds on syntropy, and syntropy flows backward in time, the parameters of the autonomic nervous system that support the vital functions must react in advance to future stimuli.*"

As part of my doctoral thesis in cognitive psychology, I conducted four experiments using heart rate measurements to study this retrocausal hypothesis.[2]

Each experimental trial was divided into 3 phases:

- *Phase 1,* in which 4 colors were displayed one after the other on the computer screen. The subject had to look at these colors and during their presentation the heart rate was measured.
- *Phase 2,* in which an image with 4 colored bars was displayed and the subject had to try to guess the color that the computer would have selected.
- *Phase 3,* in which the computer randomly selected the color and showed it full screen.



The hypothesis was that in the case of a retrocausal effect differences should be observed among the heart rates measured in phase 1 in correlation with the target color

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[2] Vannini A. e Di Corpo U., Retrocausalità, esperimenti e teoria, www.amazon.it/dp/1520892527

selected in phase 3 by the computer. In the absence of the retrocausal effect, the heart rates differences associated with each color of the target should vary around the zero value.

A marked difference was observed within most subjects. However, in some subjects the heart rate increased when the target color was blue and decreased when the target was green. In others exactly the opposite was observed and when the statistical data analysis was conducted in a classical way, adding the effects observed among subjects, opposite effects canceled each other. It was found that when studying retrocausal effects parametric statistical techniques, such as analysis of variance (ANOVA) or Student's t, are not suitable while nonparametric techniques such as Chi Square and Fisher's exact test are appropriate. This is consistent with the distinction made by Stuart Mill in methodology of differences and methodology of concomitant variations.[3]

Mill showed that causality can be studied using:

- The methodology of differences: "*If an element of difference is introduced in two initially similar groups, the differences that are observed can only be attributed to this single element that was introduced.*"
- The methodology of concomitant variations: "*When two phenomena vary concomitantly, one may be the cause of the other or both are united by the same cause.*"

The study of syntropic phenomena requires the use of the methodology of concomitant variation[4] based on dichotomous variables (yes/no). This allows to analyze together quantitative and qualitative, objective and subjective information and to manage an unlimited number of variables simultaneously.

The last experiment of my Doctorate used random sequences of colors were the chance of being selected was 35% for the lucky color, 15% for the unlucky color and 25% for the neutral colors. The task given to the subjects was to guess the highest number of colors selected by the computer (target). Subjects were not aware that colors had a different chance of being selected.

This design allows to study together Fantappiè's retrocausal hypothesis and Damasio's

[3] Stuart Mill, *A System of Logic*, 1843.
[4] See: www.amazon.com/dp/1520326637 and www.sintropia.it/sintropia.ds.zip

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learning hypothesis:

- *Retrocausal effect.* Differences in heart rate (HR) frequencies observed in phase 1, in association with unpredictable random targets selected by the computer in phase 3 can be attributed only to a retrocausal effect.
- *Learning effect.* Differences in heart rate (HR) frequencies observed in phase 1, in association with the choice operated by the subject in phase 2, can be interpreted as a learning effect.

Hypotheses were the following:

- *Retrocausal hypothesis*: differences in heart rate (HR) measurements in phase 1 were expected in association with target colors (phase 3) and were interpreted as retrocausal effects, considering the fact that the selection of target colors happens in phase 3 and heart rates are measured in phase 1.
- *Learning hypothesis*: according to the works of Antonio Damasio[5] and Antoine Bechara[6] a learning effect is expected in the form of heart rate differences measured in phase 1 in association with the choice (lucky or unlucky) operated by the subject in phase 2; these differences should increase during the experiment.
- *Interaction between retrocausal and learning effect*: the retrocausal effect and the learning effect share the same somatic markers and are therefore both assessed through heart rates. The hypothesis is that at the beginning of the experiment only the retrocausal effect can be detected, then the learning effect starts building up and disturbs the retrocausal effect which decreases. At the end, the retrocausal and learning effects separate and can be detected. Clues of a possible interaction emerged during the development of the software. Subjects involved in the first 3 experiments reported a "butterfly" feeling in the stomach in association with the choice of target stimuli, whereas subjects involved in testing the design of this last experiment did not report the butterfly feeling and the retrocausal effect showed with less strength. This fact suggested that the learning effect could disturb the retrocausal effect.

From a software perspective the different probability for each color was obtained randomly selecting in phase 3 a number from 1 to 100. When the number was between 1

[5] Damasio AR (1994), *Descarte's Error. Emotion, Reason, and the Human Brain*, Putnam Publishing, 1994.
[6] Bechara A (1997), Damasio H, Tranel D and Damasio AR (1997) *Deciding Advantageously before Knowing the Advantageous Strategy*, Science, 1997 (275): 1293.

and 35 the lucky color was shown, between 36 and 50 the unlucky color was shown, between 51 and 75 the first neutral color was shown and between 76 and 100 the last neutral color was shown. The same number could be selected again, making each color totally independent from the previous ones. In the 3,000 trials of this experiment (30 subjects x 100 trials per subject) the lucky color was selected 36.15% times, the unlucky color 14.13% and the neutral colors 24.86% each.

The following instructions were given to the experimenter: inform the subject about the total time of the experiment (around 40 minutes); choose a quiet room, where the subject can be left alone for all the length of the experiment; start the recording of the heart rate frequency only after it has stabilized (initially, heart rate frequency measurements are altered because of the movements that the subject makes in order to apply the heart rate measuring device; the stabilization of the heart rate requires less than a minute from when the subject sits in front of the computer); inform the subject about the task (try to guess the highest number of colors selected by the computer); begin the experiment only after starting the recording of the heart rate measurements; follow the subject for the first trial, in order to check that he/she has understood the task; leave the subject alone in the room where the experiment is carried out.

At the end of each experiment the following 2 files were merged:

- the file with heart rate measurements, produced by the SUUNTO software Training Monitor 2.2.0. In this file heart rate measurements were associated with the time of the measurement (provided by the clock of the computer);
- the file produced by the Delphi Pascal software of the experiment. This file contained the exact time of presentation of stimuli (in milliseconds), the choice operated by the subject and the selection operated by the computer, associated with the characteristics of the stimuli.

For each subject an immediate feedback of the retrocausal effect was provided in the form of a table which briefly showed the observed differences:

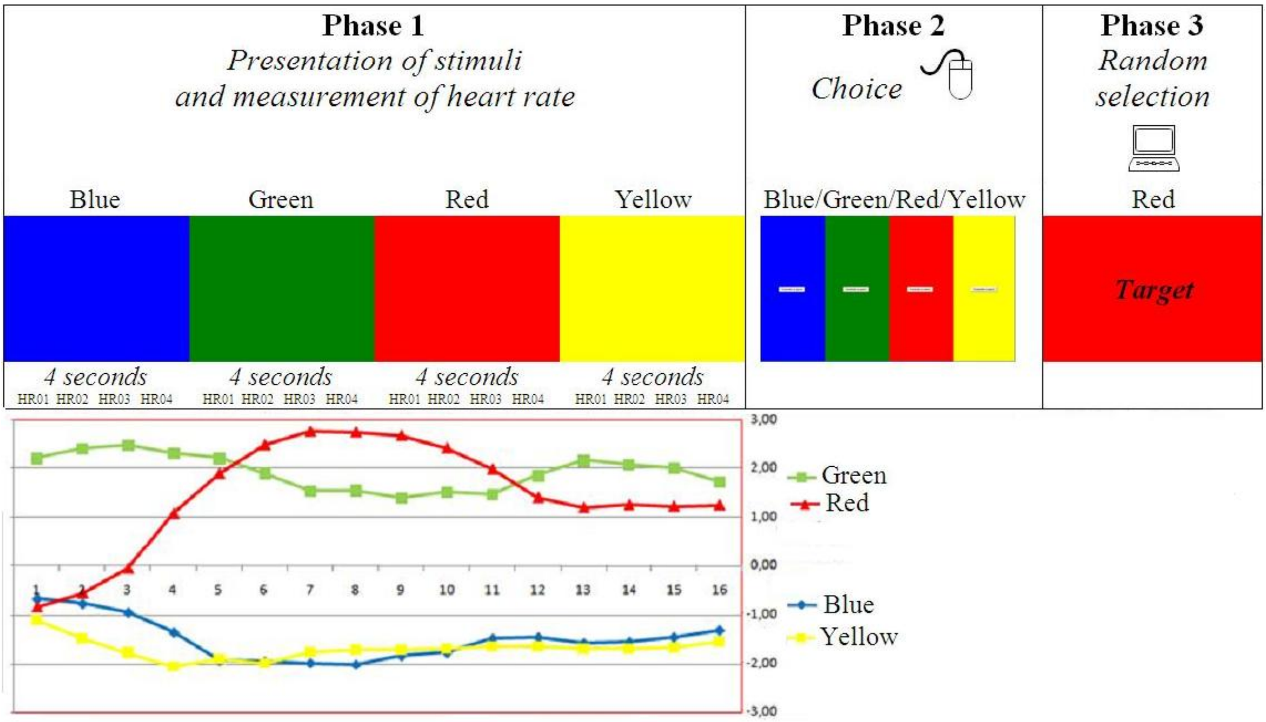
Example of feed-back table									
Subject n. 21					Subject n. 7				
	Blue	Green	Red	Yellow		Blue	Green	Red	Yellow
HR 1:	-0.671	2.200	-0.840	-1.103	HR 1:	0.276	-0.775	0.040	0.378
HR 2:	-0.772	2.399	-0.556	-1.471	HR 2:	0.231	-0.750	0.133	0.298
HR 3:	-0.950	2.467	-0.056	-1.766	HR 3:	0.210	-0.862	0.173	0.414
HR 4:	-1.353	2.310	1.080	-2.054	HR 4:	0.150	-0.913	0.187	0.560
HR 5:	-1.928	2.204	1.894	-1.892	HR 5:	0.117	-0.850	0.187	0.545
HR 6:	-1.954	1.897	2.474	-1.993	HR 6:	0.048	-0.875	0.227	0.640
HR 7:	-1.982	1.535	2.752	-1.755	HR 7:	-0.067	-0.688	0.320	0.491
HR 8:	-2.015	1.543	2.733	-1.704	HR 8:	-0.077	-0.763	0.373	0.524
HR 9:	-1.831	1.397	2.665	-1.704	HR 9:	-0.129	-0.712	0.427	0.482
HR 10:	-1.770	1.508	2.407	-1.691	HR 10:	-0.109	-0.700	0.467	0.375
HR 11:	-1.482	1.468	1.981	-1.641	HR 11:	-0.174	-0.625	0.467	0.402
HR 12:	-1.458	1.853	1.404	-1.637	HR 12:	-0.249	-0.650	0.600	0.378
HR 13:	-1.572	2.154	1.199	-1.679	HR 13:	-0.259	-0.625	0.573	0.402
HR 14:	-1.544	2.079	1.260	-1.676	HR 14:	-0.296	-0.525	0.573	0.348
HR 15:	-1.452	1.994	1.226	-1.661	HR 15:	-0.283	-0.513	0.507	0.405
HR 16:	-1.311	1.727	1.255	-1.541	HR 16:	-0.220	-0.525	0.413	0.438
General total:	83.764				General total:	0.000			

In the previous example we see feedback tables for subjects n. 21 and n. 7. Feedback tables consisted of 16 lines, one for each of the 16 heart rate frequencies measured in phase 1. Phase 1 is repeated 100 times. It is therefore possible to calculate 16 mean value differences for each color when it is target and when it is not target. These differences provide a feedback on the retrocausal effect.

For subject n. 21, in the first line (HR 1), we read that the mean value difference of the heart rate frequencies in phase 1, when the target is blue compared to when the blue is not a target is 0,671 heart beats lower. The second line is relative to the second heart rate frequency measured in phase 1 and its value for the blue color, when target, is 0,772 heart beats per minute lower.

The greater the difference between mean values (both positive and negative), the greater is the retrocausal effect. Statistical analyses were performed considering only differences greater than 1.5, since these values usually indicate a 0.01 probability error. A general total value is calculated considering the absolute values (differences without sign) above the value 1.5. For subject 21 we get a general total effect of 83.764, whereas for subject 7 we have a general total effect equal to zero.

Feedback tables can be represented graphically. We see that the retrocausal effect spreads all over phase 1. It is important to note that the effect is not limited to the target color in phase 1.



Feedback tables were used to assess if something was hindering the experiment. In the first 7 subjects the effect was practically null: 4 subjects showed a general total equal to zero and 3 showed a general value lower than 15. The experiment was being conducted using an old laptop computer with a low brightness of the display and of the colors. It was decided to change computer with brighter colors and a wider screen. Once this change was made, a sudden increase in the values of the effect in the feedback tables was observed. Using the new computer sixteen subjects showed general values of the effect over 15, three lower than 15 and five equal to zero. Changing computer, the number of subjects with no effect decreased from 57% to 21%.

When the total value in the feedback tables is calculated adding the real values (with the sign) it tends to zero. This explains why the differences, comparing all targets and non-targets in the first experiment, were null, whereas when the comparison was made within each color, they became statistically meaningful.

Mean values in feedback tables were used as raw data. Trials were divided into 3 groups: the first 33 trials (starting from the second trial) the central 33 trials and the last 33 trials. For each subject 3 feedback tables were used. The first trial was removed from the tables.

The *learning effect* was analyzed using “choice feedback tables”. Choice feedback tables were calculated for each subject, for each group of trial (first 33 trials, central 33 trials

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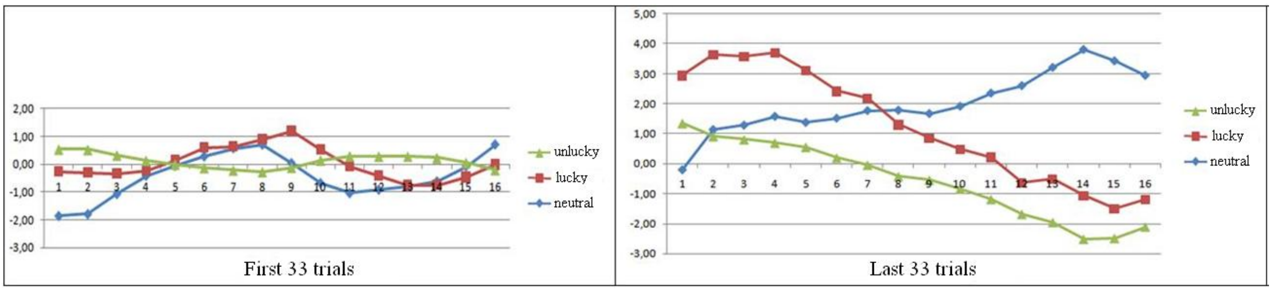
and last 33 trials) and were relative to each of the 16 HR measured in phase 1. Differences of HR values were calculated in association with the choice (lucky, unlucky and neutral) operated by the subject in phase 2. In the following example a "choice feedback table" is shown for subject n. 20.

Differences in heart rate mean values measured in phase 1 in association with the choice operated by the subject in phase 2							
Subject 20 – first 33 trials				Subject 20 – last 33 trials			
Choice:	Neutral	Lucky	Unlucky	Choice:	Neutral	Lucky	Unlucky
HR 1:	-1.857	1.597	0.800	HR 1:	-0.202	3.143	-1.591
HR 2:	-1.790	1.472	0.845	HR 2:	1.136	2.507	-2.727
HR 3:	-1.070	0.722	0.675	HR 3:	1.283	2.300	-2.773
HR 4:	-0.412	0.167	0.380	HR 4:	1.577	2.121	-3.000
HR 5:	-0.055	0.181	-0.120	HR 5:	1.375	1.729	-2.545
HR 6:	0.283	0.306	-0.715	HR 6:	1.515	0.907	-2.227
HR 7:	0.577	0.056	-0.845	HR 7:	1.768	0.414	-2.227
HR 8:	0.706	0.194	-1.170	HR 8:	1.783	-0.479	-1.727
HR 9:	0.044	1.139	-1.290	HR 9:	1.669	-0.807	-1.409
HR 10:	-0.673	1.194	-0.375	HR 10:	1.915	-1.443	-1.318
HR 11:	-1.033	0.958	0.370	HR 11:	2.353	-2.136	-1.409
HR 12:	-0.912	0.500	0.700	HR 12:	2.599	-3.243	-1.045
HR 13:	-0.790	0.042	1.030	HR 13:	3.206	-3.714	-1.455
HR 14:	-0.614	-0.139	0.985	HR 14:	3.801	-4.871	-1.455
HR 15:	-0.070	-0.403	0.530	HR 15:	3.423	-4.921	-1.000
HR 16:	0.713	-0.736	-0.175	HR 16:	2.941	-4.143	-0.909
General total:	5.244			General total:	128.018		

Values tending to zero indicate no anticipatory heart rate reaction previous to the choice, whereas high values (positive or negative) indicate an anticipatory reaction. Choice tables data were represented graphically in the following way:



Graphical representation of the choice feedback table for subject n. 20

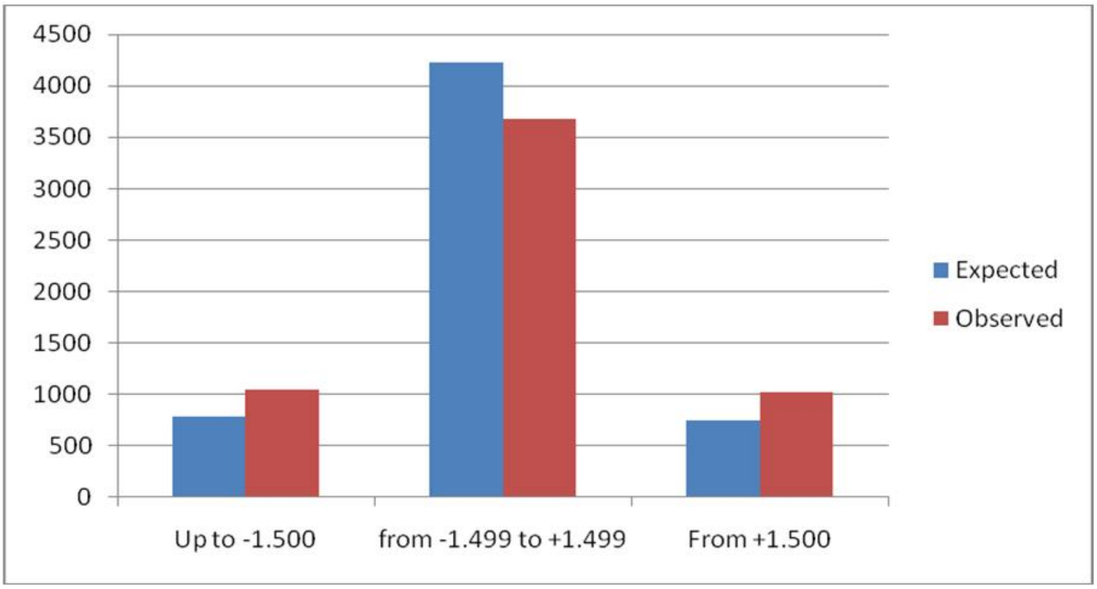
In this graphical representation we see in the last 33 trials a sharp increase in the anticipatory effect, as it is expected by Damasio's learning hypothesis. Dividing choice and feedback tables in 3 groups (first 33 trials, central 33 trials and last 33 trials), the cut off value of 1.5 does not correspond any longer to a probability error of 1% ($p<0.01$), but it was considered a good threshold value for the analyses.

In order to calculate Chi Square values, expected frequencies were needed. These were obtained "empirically" using non correlated targets (NCT): targets which are not correlated with the selection operated by the computer in phase 3. NCT can be generated using loops, in which the first target is blue, the second green, the third red and the fourth yellow and repeating this sequence for all the 100 trials. It was decided to use loops, since targets generated randomly produce expected frequency distributions which vary and which require the experimenter to choose among distributions. This could lead to an artifact since a distribution which is most convenient in order to obtain statistically significant results could be chosen. Using NCT for the production of expected frequencies, the following table was obtained for the retrocausal effect:

Frequencies	*Differences of the mean values*			*Total*
	Up to -1.500	**-1.499 to +1.499**	**+1.500 and over**	
Observed	1053 (17.83%)	3680 (63.89%)	1027 (18.28%)	5760 (100%)
Expected	781 (13.56%)	4225 (73.35%)	754 (13.09%)	5760 (100%)

Observed and expected frequencies in the distribution of mean differences of HR, measured in phase 1 in association with target colors selected by the computer in phase 3. Chi Square = 263.86.
Value of Chi Square 13.81 corresponds to p=0.001

Representing this table in a graphical way:



Graphical representation of the retrocausal effect

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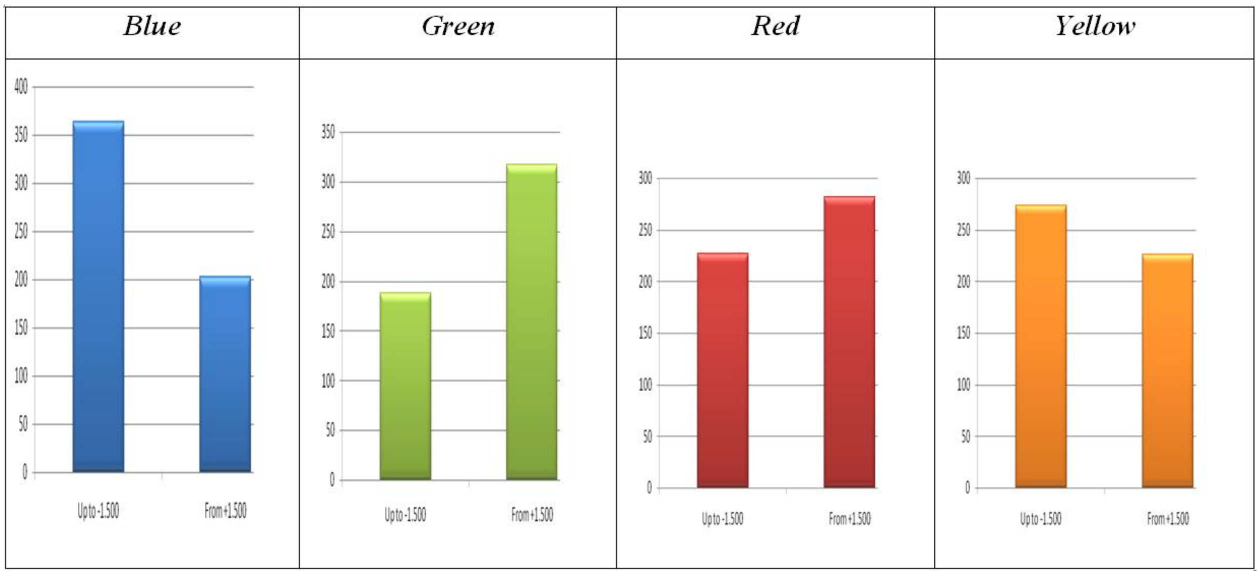
In the first group, on the left, differences up to -1.5 are associated with an observed frequency of 17.83% and an expected frequency of 13.56%; in the central class (from -1.499 to +1.499) the observed frequency is 63.89% compared to an expected frequency of 73.35%; in the last class, on the right, the observed frequency is 18.28%, the expected frequency is 13.09%. The difference between observed and expected frequencies is equal to a Chi Square of 263.86 which, compared to 13.81 for an error probability of $p<0.001$, results to be extremely significant. It was not possible to use the exact test of Fisher since this test can be applied only to 2x2 tables.

Differences	**Colours**				**Total**	**N.C.T.**
	Blue	**Green**	**Red**	**Yellow**		
From + 1.500	14.0%	22.0%	19.6%	15.7%	17.8%	13.09%
-1.499 to +1.499	60.7%	64.9%	64.6%	65.3%	63.9%	73.35%
Up to -1.500	25.3%	13.1%	15.8%	19.0%	18.3%	13.56%
	100% (n=1,440)	100% (n=1,440)	100% (n=1,440)	100% (n=1,440)	100% (n=5,760)	100.00%

Distribution of the differences of HR mean values (ph. 1) associated with the selection operated by the computer (ph. 3).

The Chi Square value for the blue color is 176.41 ($p<1/10^{27}$), for the green color the retrocausal effect is Chi Square 102.7, for the red color 60.82 and for the yellow color 56.67. This is a graphical representation of these results:



Positive and negative statistically significant differences of HR per color.
Whilst on the blue color the effect prevalently takes the form of a decrease in HR and on the green color it takes the form of an increase in the HR, for red and yellow the effect is distributed in a balanced way between subjects who show a significant increase in HR and subjects who show a significant decrease in HR, becoming therefore invisible to parametric statistical analyses.

In the first three experiments the retrocausal effect could be seen only on some colors which changed randomly from one experiment to the other. It was discovered that when the analysis is carried out using nonparametric statistics, where the effect does not need to be added, it showed on all the colors. The previous graphical representation shows that for the blue and green colors the retrocausal effect is unbalanced. Consequently, the effect does not show when added in parametric statistics analyses. In the case of the red and yellow colors, the negative side and positive side of the effect are balanced and therefore they become invisible to parametric statistics.

Fisher's exact test requires 2x2 tables where only one cell is compared with all the rest. The difference between observed and expected frequencies for the blue color corresponds to a statistically significant value of $p=0,4/10^{14}$, that is to say an error probability of p=0.000000000000004. This value was calculated without using the non-correlated targets (NCT), but using only the totals of the 2x2 tables, and confirms the retrocausal effect.

Damasio's learning hypothesis states that the choice (guess) of the subject in phase 2 is preceded by the activation of neurophysiological parameters of the autonomic nervous system such as skin conductance and heart rate frequencies. The learning hypothesis expects a stronger activation of the heart rate frequency in the last trials of the experiment.

Differences	**Colour chosen by the subject**			**Total**	**N.C.T.**
	Neutral	**Lucky**	**Unlucky**		
From + 1.500	14.0%	16.6%	17.2%	16.0%	13.1%
- 1,499 to +1,499	73.5%	66.0%	66.0%	68.5%	73.3%
Up to -1,500	12.5%	17.4%	16.8%	15.5%	13.6%
	100% (n=1,440)	100% (n=1,440)	100% (n=1,440)	100% (n=4,320)	100.0%

Global learning effect. Distribution of HR differences (phase 1) in association with the color chosen by the subject in phase 2. This table was calculated considering all the subjects and all the trials.

The observed frequencies for neutral colors coincide with the expected frequencies (73.5% compared to 73.3 expected), whereas for the lucky and unlucky colors there is a difference between observed frequencies and expected ones. This difference is associated with a Chi Square of 39.15 ($p<1/10^9$) which confirms the learning effect.

Subjects can choose among four colors: two neutral colors, a lucky color and an unlucky color. At the start of the experiment participants were told that colors are randomly selected. During the experiment subjects should learn the different probabilities and this should show in the form of a different activation of heart rate frequencies in phase 1, before operating the choice in phase 2.

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Lucky, unlucky and neutral colors are selected randomly at the start of the experiment. During the experiment no one knows which are the lucky and unlucky colors, only at the end of the experiment this information is saved in the data file. The hypothesis is that the learning effect should increase while the experiment progresses and that it should be particularly strong in the last trials.

Differences (*absolute values*)	**Trial**			**Total**	**N.C.T.**
	2-34	**35-67**	**68-100**		
Up to 1.499	69.4%	73.8%	62.3%	68.5%	73.3%
From 1.500	30.6%	26.2%	37.7%	31.5%	26.7%
	100% (n=1,440)	100% (n=1,440)	100% (n=1,440)	100% (n=4,320)	100.0%

Distribution of mean differences of HR in phase 1 according to the choice operated by the subjects, divided for group of trials.

The previous table shows an initial effect in the first 33 trials with a Chi Square value of 11,53, just over 0.001 of probability. In the middle 33 trials no effect is observed. In the last 33 trials the distribution differs significantly from the expected one (N.C.T. column). Chi Square value is 89,77 which corresponds to $p<1/10^{22}$. These results show that in the last 33 trials of the experiment the learning effect is strongly significant.

The following table considers only the last 33 trials. The learning effect of the lucky and unlucky colors is stronger, compared to the general table.

Differences	**Colour chosen by the subject**			**Total**	**N.C.T.**
	Neutral	**Lucky**	**Unlucky**		
From + 1.500	15.8%	19.2%	24.0%	19.6%	13.1%
- 1.499 to +1.499	68.4%	57.7%	60.8%	62.3%	73.3%
Up to -1.500	15.8%	23.1%	15.2%	18.1%	13.6%
	100% (n=480)	100% (n=480)	100% (n=480)	100% (n=1.440)	100.0%

Distribution of the differences among mean HR values measured in phase 1 associated with the choice performed by the subject (phase 2). This table is relative to the last group of 33 trials, for all the subjects.

The effect does not always show in the same direction and it is therefore not additive.

Differences (*absolute values*)	**Trial**			**Total**	**N.C.T.**
	2-34	**35-67**	**68-100**		
Up to 1.499	59.6%	70.8%	61.2%	63.9%	73,3%
From 1.500	40.4%	29.2%	38.8%	36.1%	26,7%
	100% (n=1,920)	100% (n=1,920)	100% (n=1,920)	100% (n=5,760)	100,0%

Distribution of mean value HR differences in phase 1 associated with the target selected by the computer in phase 3

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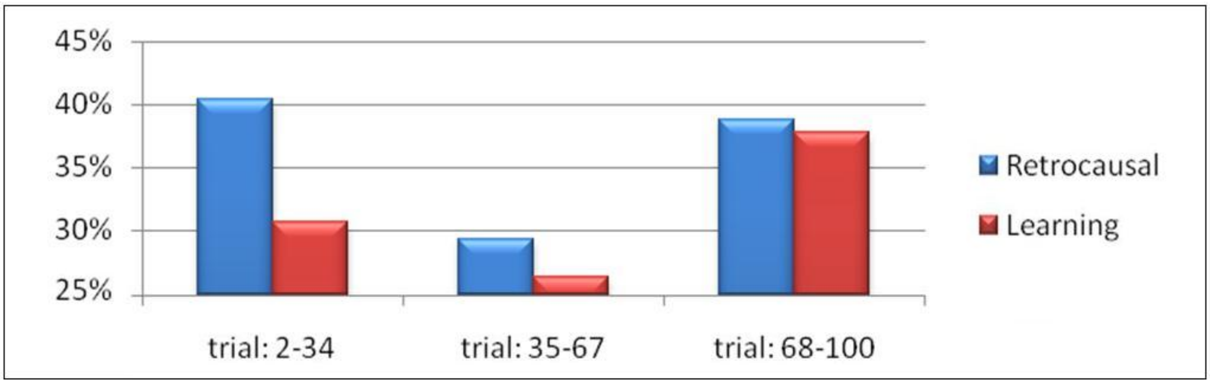
In this last table, which is relative to the retrocausal effect, we see that the effect is strong in the first 33 trials, it becomes null in the middle trials and it is again strong in the last 33 trials. Using the exact test of Fisher, in the first 33 trials the effect is significant with $p<0.76/10^{13}$, in the middle trials it disappears, and in the last 33 trials it returns with $p=0.95/10^{10}$. Considering together the retrocausal and learning effect we see a strong retrocausal effect in the first 33 trials, whereas the learning effect is limited. Then, in the middle trials both the learning and retrocausal effect disappear. At the end of the experiment, in the last 33 trials, both effects become strongly significant. The increase in the last 33 trials equals $p=0,95/10^{10}$ for the retrocausal effect and $p<1/10^{22}$ for the learning effect.



Interaction between retrocausal and learning effect.
Statistical significance of 1% starts at frequency values of 29%

In the first 33 trials the retrocausal effect is strong, since the learning effect has not yet emerged. The two effects conflict in the middle 33 trials causing a decrease of the retrocausal effect and in the last 33 trials a strong rise in both the effects is observed.

The next table is relative to the subject with the highest values of general differences in the feedback table. The retrocausal effect is extremely strong from the beginning of the experiment, but it drastically drops in the central part of the experiment where percentage values become similar to the expected ones (NCT column) and then return strong again in the last trials.

Differences (*absolute values*)	**Trial**			**Total**	**N.C.T.**
	2-34	**35-67**	**68-100**		
Up to 1.499	26.6%	67.2%	29.7%	44.0%	73.3%
From 1.500	73.4%	32.8%	70.3%	56.0%	26.7%
	100% (n=64)	100% (n=64)	100% (n=64)	100% (n=192)	100.0%

Distribution of mean differences of HR measured in phase 1 in association with the target selected by the computer in phase 3, divided by trials. This table considers only the data of the subject with the highest general total in the feedback table.

When subjects discover the existence of a lucky color, he/she could start choosing always this color, increasing in this way the correct guesses from 25% (random) to 35% of the lucky color. This increase was not observed, in the first 33 trial the target was guessed correctly 24.75% times, in the middle trials 24.65% and in the last trials 25.47%. This data shows that even if the learning effect is strongly visible in HR differences, it does not enter the cognitive system.