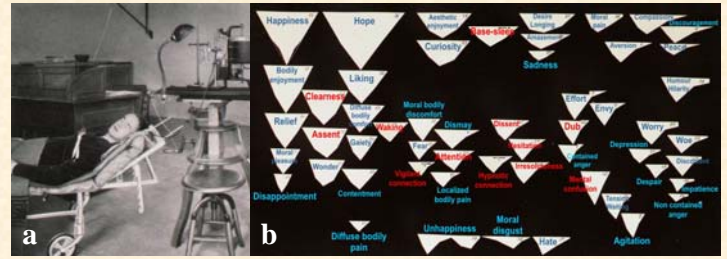


Changing vision by changing breath

Barbara F. M. Marino, Natale Stucchi, Fabio Riva[†] & Paola Noris

Dip. di Psicologia, Università degli Studi di Milano-Bicocca, 1 P.zza dell'Ateneo Nuovo, I 20126 Milano, Italy;
 † Istituto Clinico Sant'Ambrogio, 16 via Faravelli, I 20149 Milan, Italy; E-mail: barbara.marino@unimib.it

Introduction Previous psychophysiological studies have suggested that breathing can influence emotional states and, more generally, cognitive mental states (Benussi, 1925; Bloch *et al.*, 1986; Boiten *et al.*, 1994). An interrelation between mind and breathing is also claimed by some oriental traditions such as yogic pranayama and aikido. Two experiments were run to investigate whether breathing has an effect on visual perception. Specifically we tested the possible influence of breathing on both the magnitude of the Brentano–Müller–Lyer illusion (Exp 1) and the visual system sensitivity (Exp 2).



a) Apparatus used by Benussi in 1925 to record the breathing correlates of mental states; b) Respiratory symptoms of the 42 emotional states (blue labelled) and the 12 mental states (red labelled) investigated by Benussi.



(a) View of the experimental apparatus; (b) Frontal and dorsal positions of 5 hemispheric markers whose 3D coordinates were recorded by the optoelectronic motion analyser; (c) Position of the polygraph sensors used to detect HR (middle finger), GSR (forefinger and ring-finger) and T (little finger).



PHASE 1 - Respiratory Base Line Recording

Participants' spontaneous respiratory activity of the chest and abdomen was recorded by means of an optoelectronic motion analyzer for 1 min. Heart rate (HR), galvanic skin response (GSR) and temperature (T) were also recorded by mean of a polygraph.

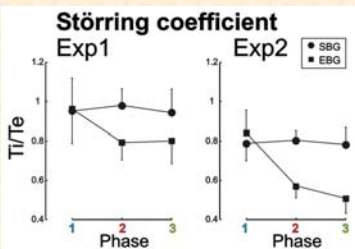
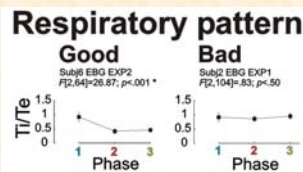
PHASE 2 - Respiratory Training

Half of the participants were invited to breath out slowly and smoothly (Elongated Breathing Group, EBG) for 4 min whereas the other half breathed spontaneously (Spontaneous Breathing Group, SBG). EBG's breathing is similar to the yogic "1:2 breathing technique" that is supposed to cause a sense of relaxation, relief and a decreasing of attention.

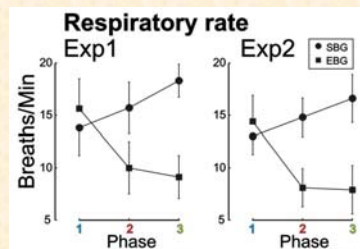
PHASE 3 - Experimental Task

Participants performed the experimental task. EBG's participants were invited to try to breath as in the training phase spontaneously.

Time (Min) Physiological results Respiratory data analysis

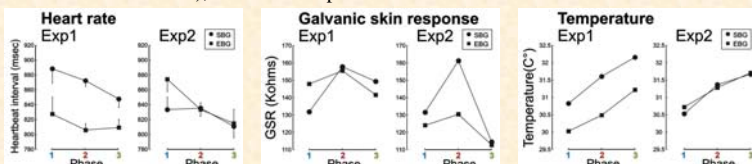


• All EBG's participants (except 2 of Exp1) significantly elongated their exhalation during the breathing training phase and kept that respiratory pattern also when they performed the experimental task phase.



Polygraph data analysis

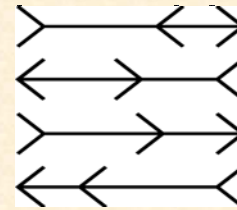
The possible effect of breathing on heart rate (expressed as the time interval between 2 consecutive heartbeats), GSR and temperature was controlled.



• The 1:2 breathing technique performed for 4 min did not affect heart rate, galvanic skin response and temperature.

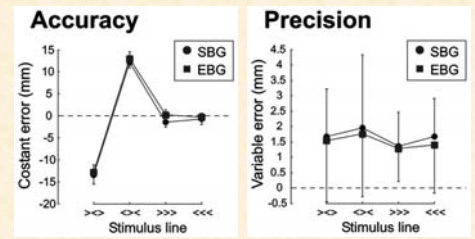
Experiment 1

Stimuli



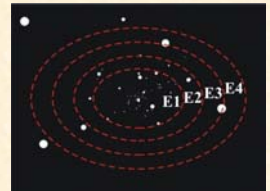
20 participants completed a **line bisection task**. They were asked to position the middle wing so that the horizontal lines appears to be subdivided into two segments of equal length.

- Breathing had no effect on the magnitude of Brentano illusion
- Breathing had no effect on participants' precision

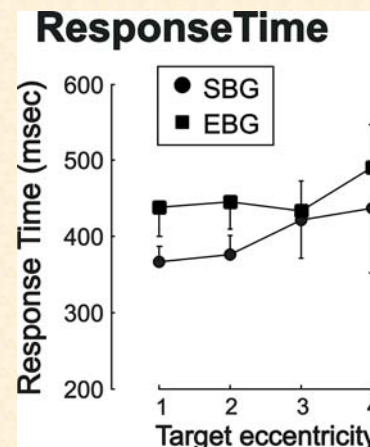


Experiment 2

20 participants completed a **target detection task**. They were required to detect a stationary red dot (0.30°) within an expanding optic flow by clicking the left mouse button as soon as possible.



A frame of the expanding optic flow and the 4 concentric elliptical areas of different eccentricities in which the target could appear.



A 2 ways ANOVA on RTs revealed that EBG's participants were about 50 msec slower than SBG's participants ($F(1,18)=4.36; p<.05$).

The difference in RTs between SBG and EBG may result from:

- 1- **The influence of breathing on vision.** The 1:2 breathing technique decreased participants' visual sensitivity;
- 2- **A dual-task interference.** It is not possible to exclude that during the experimental task, EBG participants breathed as in the training phase voluntarily rather than spontaneously;
- 3- **A motor interference.** Some participants reported that responding was more difficult during exhalations than during inhalations.

References

- Benussi, V. (1925). *La suggestione e l'ipnosi come mezzi di analisi psichica reale*. Bologna: Zanichelli
 Bloch, S., Lemeignan, M., & Aguilera, N. (1991). Specific respiratory patterns distinguish among human basic emotions. *International Journal of Psychophysiology*, *11*, 141-154.
 Boiten, F. A., Frijda, N. H., & Wientjes, C. J. E. (1994). Emotion and respiratory patterns: review and critical analysis. *International Journal of Psychophysiology*, *17*, 103-128.

Acknowledgements

We wish to thank the scientific committee of the Electronic Edition of Benussi's Nachlass (EEBN) for having got us the permission to use Benussi's documents in this poster.