Self and world: large scale installations at science museums

SHINSUKE SHIMOJO *

Division of Biology, Computation and Neural Systems, California Institute of Technology, Pasadena, CA 91125, USA and JST.ERATO Shimojo Implicit Brain Functions, NTT R and D Center; Morinosato, Atsugi, Kanagawa, 243-0198 Japan

Received 9 September 2006; accepted 3 March 2007

Abstract—This paper describes three examples of illusion installation in a science museum environment from the author’s collaboration with the artist and architect. The installations amplify the illusory effects, such as vection (visually-induced sensation of self motion) and motion-induced blindness, to emphasize that perception is not just to obtain structure and features of objects, but rather to grasp the dynamic relationship between the self and the world. Scaling up the size and utilizing the live human body turned out to be keys for installations with higher emotional impact.

Keywords: Visual illusion; vection; motion-induced blindness; science museum.

INTRODUCTION

Art and science meet at illusions

Traditionally, artists and visual scientists both dealt with perceptual experience, but usually from different viewpoints. Artists were mainly interested in the representational content and emotional effects of visual perception, whereas scientists were interested more in the neural mechanisms or mental processes underlying perception. Recently, however, there is a noticeable overlap between their approaches, and as a result they interact and collaborate more.

Retrospectively, several factors seem to have contributed to such changes. First, scientific studies of visual perception in psychophysics, neuroscience, and cognitive sciences have advanced, and the results have been disseminated outside the scientific community. Under such influences, artists have become more experimental and analytical, with increased awareness about mechanisms underlying perception. Second, scientists’ interests used to be restricted to quantitative and objective analyses
of the relationship between stimulus and behavior, partly because of influence by
the behaviorism movement within the field of psychology. Many now express in-
terest in conscious and subjective experience of perception, perhaps partly owing to
a gradual recovery from the behaviorist’s taboos, the development of cognitive sci-
ence approaches to internal processes, and noninvasive human brain-imaging tech-
niques, but more importantly to enriched phenomenology of perception way beyond
what used to be studied scientifically.

Such trends should be welcomed for a strong and obvious reason, i.e. science
education, and outreach activities in particular. Perceptual illusions provide ample
opportunities for such efforts, mainly owing to the vigorous impact of the perceptual
experience. The current paper aims to contribute to such trends by describing
the author’s own creation of visual illusion demonstrations at science museum in
collaboration with an artist.

To be more specific, this paper describes three pieces of large-scale installations
in a science museum, which have a common theme: perception is ambient and
proprioceptive (Gibson, 1950, 1979). Through direct experience, the observers
realize that visual perception is not just for recognizing objects in the external world,
but also to grasp the spatial relationship of self to the world. I will explain what type
of mechanical setups can be built to demonstrate perceptual illusions such as vection
(or visually-induced sensation of self motion) and switching of the spatial frame of
reference.

The first piece utilizes a motor-driven rotation of a physical structure to generate
dynamic optical stimulation in the observer’s visual field. As a result, the audience
unanimously experiences a robust effect of vection. The second exhibition carries
a similar message (i.e. perception is ambient and proprioceptive), except that
the setup is ‘minimal’ in the sense that it is a solid stable structure without
anything physically or optically moving. It demonstrates dynamical changes in
the spatial frame of reference as a result of interaction between the tilted structure
and the observer’s own posture. This turned out to yield not only bistable, but
rather intriguing tristable percepts which were dependent on the observer’s position
and posture, and which may deserve some detailed qualitative analysis for its
scientific merits. The last exhibition piece employs a rotating mirror ball to
demonstrate vection, a similar effect to the first piece, except that it creates the
effect without physically rotating a large structure, but just by generating optical
flows. Moreover, it turned out to be very effective for demonstrating yet another
type of stunning perceptual illusion, namely, MIB (Motion-Induced Blindness) on
a large scale.

The core visual effects demonstrated in these examples are already known in
the literature, yet these installations eloquently demonstrate that scientific find-
ing is one thing, and demonstrating it to a general audience is another. There is
much room for improvement in terms of technique, device, design, scale, mate-
rials etc. for artists and educators to create demonstrations that have higher im-
pacts to non-expert audiences, including children. Such efforts do not just make