“Il Gioco delle Forme”: Design and Development of an Educational Exergame

Stefano Di Tore, Department of Human, Philosophical and Educational Sciences, University of Salerno, Salerno, Italy

Paola Aiello, Department of Human, Philosophical and Educational Sciences, University of Salerno, Salerno, Italy

Diana Carmela Di Gennaro, Department of Human, Philosophical and Educational Sciences, University of Salerno, Salerno, Italy

Maurizio Sibilio, Department of Human, Philosophical and Educational Sciences, University of Salerno, Salerno, Italy

ABSTRACT

The study presented here concerns the results obtained from the development and the experimentation of a didactic exergame realized by the University of Salerno. The aim of this exergame, called “Gioco delle Forme”, is to evaluate, measure and “train”, by means of a playful activity with a high degree of body involvement, the skills of visual and motor integration, skills that for scientific literature are strictly linked to learning processes and considered very important in recent pedagogic debate as concerns the visual and spatial component present in specific learning difficulties. The focus of the study is on the design and development of an exer-game essentially based on manipulation of shapes involving the whole body, fundamental aspect both for the assessment of visual-motor integration skills or for the emotional participation of the user because “motor activity – not representational verisimilitude - holds the key to fluid and functional crossings between virtual and physical realms” (Hansen, 2006, p.2); this activity can also be considered as a preparatory skill for the spatial acquisition of concepts like geometrical forms, graphemes, etc. The exer-game is based on the following skills: grabbing, turning, shifting geometrical forms to make them matching with figures on screen.

Keywords: Body Involvement, Didactics, Education, Exergame, Visual-Motor Integration Skills

DOI: 10.4018/jdldc.2013010103
INTRODUCTION

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Since 1960, several researchers, such as Lefford, Bruner, Hunt, Piaget e Vereecken, developed theories that supported a sensor-motor based development of intelligence and learning. According to their studies, thought and behavior require an integration of sensory input and motor actions. (Beery, 1967). Some motor tasks such as copying the basic geometrical forms were already studied since the beginning of ‘900. Several studies have shown that copying geometrical forms is related to specific psychological functions. The author of V.M.I. test (Visual-Motor Integration test) put in evidence, in the 60s, the relation between these skills and especially:

• School performance (.50-.70);
• Reading skills (.40-.60);
• Arithmetic performance;
• Q.I.

In particular, the skill of copying geometrical forms was studied with attention by the Gestalt psychology.

These studies originate in the researches lead on perception, especially on visual perception, by Wertheimer who, in 1910, gave the first formulation of *gestalt*:

• We perceive objects as a whole and not as a sum of single sensations;
• The fundamental elements of perception are forms structured in specific ways (gestalt).

In 1912, Wertheimer published a study on *phi* phenomenon, a particular type of movement called apparent because it is perceived though it doesn’t exist in reality (Wertheimer, 1912).

Wertheimer noted that, when the time break between the two lights went under a specific threshold (200 milliseconds), the subjects involved in the experiment affirmed that they didn’t perceive two discrete stimuli anymore, that is, two separated and motionless lights turned on, but only one light moving from one position to another.

Wertheimer highlighted this phenomenon because two stationary stimuli (the lights) give origin to a unitary perception of movement (the light moving from one position to another), so our perception can’t be explained in this case reducing it to its basic components.

The *phi* phenomenon showed, in fact, how the perceptive action couldn’t be analyzed by means of a division in basic stimuli; the light movement (the most important datum emerging on a perceptive level) would be destroyed from a process of analysis, which would only lead to find stable and discrete stimuli. So, according to Gestalt psychology, when we perceive an object we don’t deal with an ensemble of fragmented sensations, first analyzed and then grouped in a synthesis, but we meet a structured unit.

In 1923 Wertheimer formulated, starting from these studies, a series of laws explaining how perceptive stimuli are organized in forms:

• The law of proximity, perceptual stimuli are organized in gestalt on the basis of their distance. At the very least they are far, the more likely they will be grouped together;
• The law of similarity suggests that similar things tend to appear grouped together. Grouping can occur in both visual and auditory stimuli;
• The law of closure holds that things are grouped together if they seem to complete some entity;