Chapter 56
Eight Tips for the Theme "Data and Forecasts"

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ABSTRACT

Paul was a common octopus living in a public aquarium in Germany. It became internationally known during the World Cup in 2010 when it was used to "predict" the results of football games. Paul correctly predicted all the outcomes. What animal was better than an octopus, with its eight tentacles-tips, in lending itself to introduce non-deterministic phenomena? In the chapter, teachers who want to develop the theme "data and forecasts" find eight ideas. These ideas are supported by the use of artifacts, digital tools, and web resources.

INTRODUCTION

Paul was a common octopus living (January 2008, October 2010) in a public aquarium at the marine life center in Oberhausen, Germany. Paul experienced some international notoriety during the 2010 World Cup when it was used to "predict" the results of football matches in which the German national football team was involved and the final (that was not played by Germany). Paul's predictions were all correct.

The octopus belongs to Octopodidae family and has eight tentacles, therefore we imagine that each of these gives us an indication as to which are the best strategies to analyze resources and obstacles of teaching probability and statistics.

Mathematical artifacts shown in the figures are the basis of a project that could be called educational gaming. The collection of materials found, purchased, and constructed is the result of many years of research work (Drivet, 2013). They are taken from https://sites.google.com/site/oggettimatematici/home site. Currently there are 210 objects and, of these, 40 relate to the mentioned subject (Figure 1).

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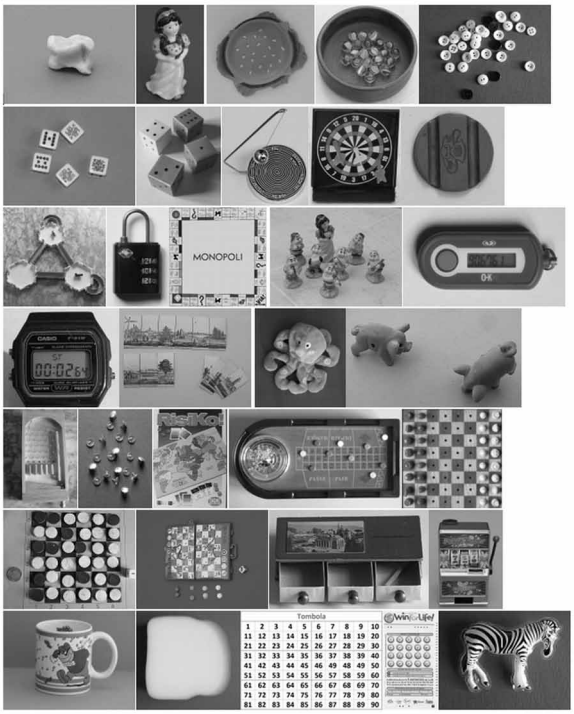
Figure 1. Data and Forecasts Objects



BACKGROUND

Numbers, geometry, relations and functions, data and forecasts are the four themes that characterize the classic division that has gradually made its way (albeit with some linguistic difference) within the Programme for International Student Assessment (PISA), the TIMMS (Trends in International Mathematics and Science Study) and, with regard to Italy, the UMI (Italian Mathematical Union), the INVALSI (National institute for the evaluation of the education and training system) and the National Guidelines for the curriculum.

This text will tackle issues related to data and forecast, only partially similar to the traditional concepts of probability and statistics.

A first starting point is provided by this quote: "Probability is the theory which organizes the world of chance phenomena. One has to start with phenomena which beg to be organized: intuition about unpredictable events, games of chance, occurrences which seem to happen without regularity etc. One then has to teach the learner to constitute the mental object for himself/herself. This is the stage preceding concept attainment but too often ignored" (Kapadia & Borovcnik, 2012).

As a matter of fact, there is a difference between the theory of probability and the theme of the data and forecasts. The task of data and forecasts means analyzing and interpreting data, developing conclusions and reasoning also with the aid of graphic representations, consciously using the calculation tools and the potential offered by IT applications.