Informal Inferential Reasoning: a Computer-based Training Environment

Joachim Engel

University of Education, Ludwigsburg, Germany; engel@ph-ludwigsburg.de

The logic behind statistical inference is complex and hard to understand for students. There have been a variety of approaches to simplify the basic model situation like nonparametric tests based on re-randomization. Others tried to simplify the basic situation to a (mere) significance test and develop simplified sigma rules for teaching. Recent research focuses on informal and intuitive approaches to statistical reasoning instead of mastery of formal mathematical procedures. We introduce a computer-based training environment ("data game") to shape intuition for a particular type of statistical decision problem. In change-point detection tasks, one must decide if a process is running smoothly or if it is out of control. A mechanism produces data sequentially with the same variability but with a built-in shift in location of the data at some point of time. The task for the students is to detect if and when the mechanism has changed the level of produced data as early as possible but without raising false alarms. The ‘data game’ is embedded in a data analysis environment. We discuss the game itself as well as its relation to statistical literacy. With reference to a framework by Zieffler, Garfield, & DelMas (2008) it is argued that ‘change-point’ detection problems are a prime environment to investigate students’ informal inferential reasoning.

Key words. Statistics education, intuitive reasoning, statistical literacy, technological learning environment.