

# Getting a GRiP on the Comprehension of Data-Flow Visual Programming Languages

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We provide a brief overview of the GRiP (Graphical Representations in Programming) Project, funded by EPSRC grants GR/L36987 and GR/L37045 and carried out in collaboration with Jon Oberlander at HCRC, Edinburgh University and Richard Cox, now at the School of Cognitive and Computing Sciences, Sussex University.

One of the main goals of the project is to investigate the issue of paradigm within visual programming languages (VPLs), and its role in novice program comprehension. We are looking in particular at data flow and control flow VPLs, and their potential uses in teaching programming. While data flow seems to be a paradigm of choice for commercial VPLs, claims that it offers particular advantages to novices have not been supported by empirical studies.

We are investigating the ways in which novices learn how to understand programs written in VPLs, and how this understanding interacts with the manner in which information present in the program is represented and/or highlighted. The methodology adopted involves the comparison of two specially designed VPLs, and draws on research by Green, Gilmore and others on the so-called 'match-mismatch' conjecture, and Pennington's work on information types.

The results provide some insights relating to the advantages of specific types of VPLs for novices, and into the processes involved in using and understanding VPLs in general. Specifically, it appears that although one language may be easier to learn and to use across the board (as evidenced by time scores), both languages produce differential effects in accuracy, with the match-mismatch conjecture being upheld. The results suggest prior experience and the culture in which one learns to program play a role along with notation and task.

Based on these results, and on data which explores the nature of novice comprehension difficulties, we are in the process of developing

a support environment for novices which we hope will scaffold the various activities which take place in the initial stages of attempting to understand visual programs.