

STUDYING COLLABORATIVE DESIGN IN FACE TO FACE, REMOTE SKETCHING, AND 3D VIRTUAL WORLD ENVIRONMENTS

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The impact of collaborative design in virtual environments on the behaviour of designers depends on the nature of the design task and the resources available to the designers. By introducing new technology, we can identify the kinds of positive impacts that should be integrated, and the kinds of negative impacts that should be eliminated, in order to improve the collaborative design environment.

We studied designers collaborating in three environments: (1) face-to-face with their current design and communication tools (pen and paper), (2) a shared remote drawing system (Group Board) with synchronous voice and video conference and (3) a 3D virtual world with synchronous voice and video conference. Collaborative design sessions of 5 architect pairs were video recorded. They respectively worked on separate design briefs in the three different design settings. Protocol analysis was used to study and compare collaborative design behaviour.

Figure 1 shows the collaborative design process of the designers over the three design environments. Patterns of design activity in face to face sketching and remote sketching were similar to each other, however patterns of design activity in 3D World were very different to them. In sketching sessions (first two) the designers cycled many times through a pattern of analysis followed by a pattern of propose. In 3D virtual world, the designers spent the initial time analysing the problem and then spent a major portion of the remaining time setting up goals.

Figure 2 shows the communication content of the three environments. Communication on representation becomes more important in the 3D

modelling environment. Representation focus is emphasized where the participants start talking about visual features of the design elements and how to bring them together. The focus on awareness increases in the media where participants are in remote locations. In all sessions, the majority of the communication is about the design, showing that a change in environment didn't cause the designers to stop being effective as designers.

The analysis of the operations on external representations is shown in Figure 3. In the sketching environments, designers created objects (via draw, re-draw, trace over actions), however during 3D modeling they copied and moved and modified objects. Figure 3 shows “Create” activity has the smallest percentage in the 3D world, while “Change” activity is higher in percentage.

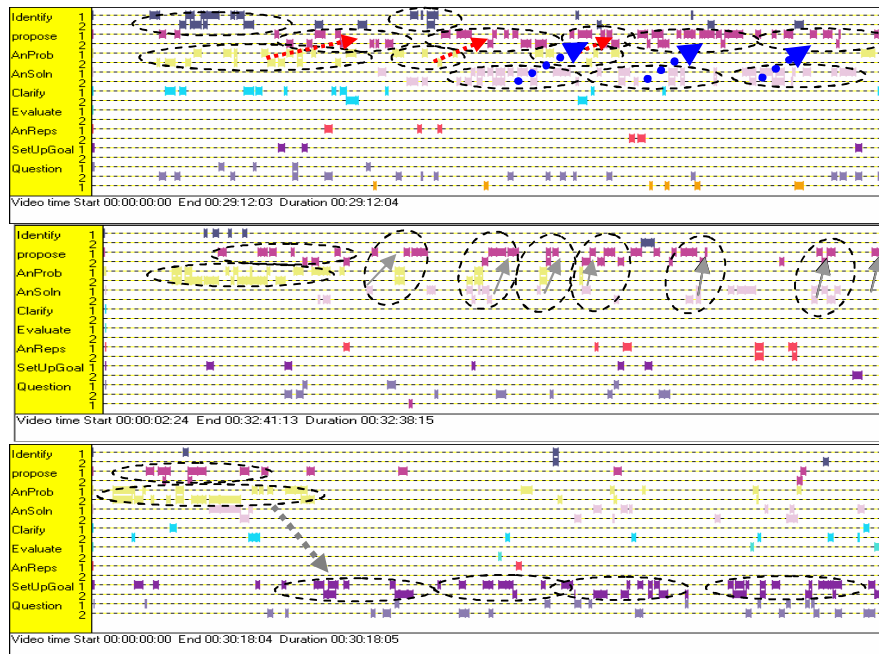


Figure 1. Design process in FTF, Group Board and 3D virtual world sessions

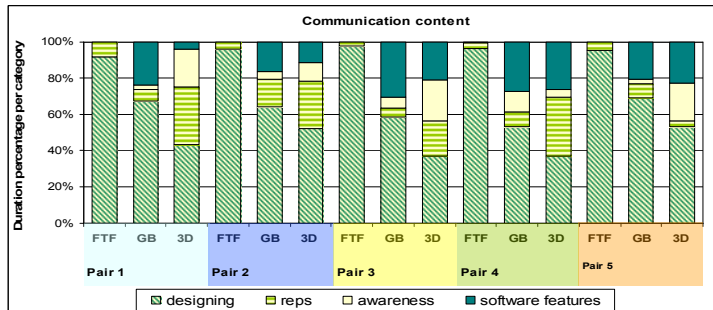


Figure 2. Communication Content over the 3 Phases

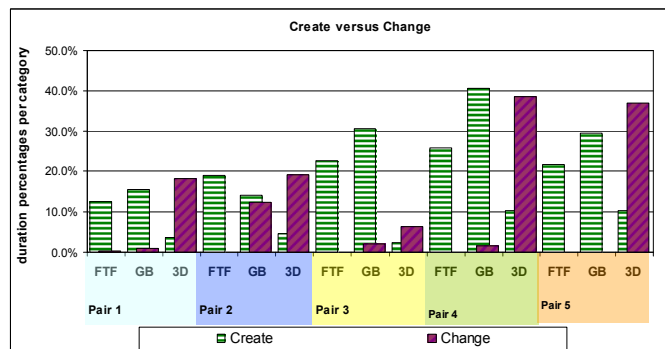


Figure 3. Operations on external representations over the three environment