

The Paperoles Project: An analysis of paper use by music composers

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ABSTRACT

Technologies such as Anoto offer a novel approach to supporting the creative design process, by integrating paper with on-line tools. However, creating successful 'augmented paper' applications requires a detailed understanding of the existing and potential roles of both paper and computers. This paper describes our study of contemporary music composers, who are highly skilled users of both. We challenge common assumptions, particularly that paper's key value lies in its flexibility and describe our early prototypes of augmented music scores. We conclude with implications for the design of augmented paper applications that support creative work.

Author Keywords

Augmented Paper, Composers, Participatory design, Musicians, Music scores

ACM Classification Keywords

H.1.2 [User/Machine Systems]: Human Factors, H.5.2 [User Interfaces]: Evaluation/methodology, Theory and methods, Prototyping, User-centred design.

INTRODUCTION

We have long been interested in the role of paper in human activity, ranging from biologists' lab notebooks, air traffic control flight strips or engineering drawings (Mackay, 1998). Each project focused on the balance that must be maintained by people who have excellent reasons for using both paper and electronic tools: each medium has its advantages and its disadvantages and we were interested in studying how to make optimal use of the two media together.

This study is somewhat different. Our user population consists of professional musicians, who use both paper and computers to compose music. Here, our goal is not to increase efficiency or accuracy, per se, but rather to support a highly individual creative process. We began by interviewing professional musicians at IRCAM, in Paris, and observing them at work. This paper describes the results of those interviews, including some counter-intuitive conclusions with respect to their use of paper. We conclude with a design scenario that illustrates how one would take these findings into account when designing an Anoto-style application, in order to enhance the musician's use of both paper and electronic media when creating music.

STUDY: INTERVIEWS OF COMPOSERS

IRCAM is a world-renowned centre for electronic and contemporary music, created in the 1970's by Pierre Boulez.

Composers and musicians come from all over the world either to compose new works or to collaborate with other musicians on new projects. Composers pose an intriguing user interface problem: how can they use the computer as tool, but still feel as though they are creating art? The problem is not to increase efficiency, but rather to enhance reflection and increase expressiveness. The composers clearly do not want a system that automatically composes for them. Instead, they need tools that help while leaving them the masters of the creative process.

We interviewed 12 composers and musical assistants at IRCAM. The composers were either proficient computer users themselves or else had extensive access to music assistants who can program for them. Most music assistants were computer scientists with additional training in musical. We interviewed both individual composers and composer-assistant pairs, in their offices or the laboratories where they composed music, to better understand the process by which they create new music. We also met with the *Analyses des Pratiques Musicales* team at IRCAM to discuss their longitudinal study with a single composer (P. Leroux) and how he used paper in the process [Donin 2006].

RESULTS

Our analysis showed that, despite access to the latest computer-music tools, these composers continue to use paper to edit, annotate and link their musical scores. Despite their technical proficiency, most composers continue to use paper documents as a fundamental part of the composition process. They are dissatisfied with the lack of connection between their off-line scores and other annotations and the on-line software that generates the resulting music. Letondal et al. (2007) report in more detail about the study: this paper concentrates on two sets of results. First, what is the chronology of paper use: When do composers use paper and the computer? Second, when given a choice, how do they choose between the two?

Chronology of paper and computer use

Why haven't composers of electronic music shifted to an entirely computer-based composition process? It is due neither to fear of computers nor to particular problems with the user interface (especially since most of their tools are designed by and for musicians). Instead, like people in other fields, (Sellen and Harper, 2003), composers choose the medium that is best suited to the purpose at hand.

We summarize the varying roles of paper and computer throughout the composition progress in Fig. 1. Composition progresses from the initial creative stage to the final piece, with much iterative development in between. Throughout this process, the artefacts change, from quick sketches in the beginning, through progressive experiments in the middle, to the final composition at the end. The characteristics that composers value in paper and the computer also change. In the beginning, most composers prefer paper because of the freedom of expression it offers. In the interim stages, they prefer a mix of paper and computer, valuing both ease of modification and power of expression. At the end of the process, most prefer