

FLOW : EXPRESSING MOVEMENT QUALITY

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INTRODUCTION

Web 2.0 technologies have created shifting roles for everyday users by allowing them to do more than just retrieve information. Users are able to interact and collaborate with each other within social media communities (e.g., Facebook or YouTube) and take on the roles of author, collaborator, or performer at various times.

The shifting roles of users not only affect the way users interact with digital media but also inspire many artists to explore new methods for producing art. For instance, online performance art enables users to author their own avatars, configure a virtual environment as a performance space, and collaboratively perform with other people in virtual spaces.

We are interested in the shifting of roles that new media artists, designers, and scientists constantly negotiate within the rapidly shifting field of new media art. *Flow* is a live dance performance piece that combines participatory interaction, artistic research process, interface design, and human-computer interaction. It represents our interpretation of the user in flux.

PERFORMANCE AND THE USER IN FLUX

Our research investigates computational approaches to recognizing movement quality. To this end, we developed a prototype system, called EffortDetect, that can be used to enrich and support human-computer interaction. EffortDetect is a real-time machine-learning system that applies Laban Movement Analysis, a rigorous framework for analyzing the human movement, to extract movement qualities from a moving body in the form of *Laban Basic Efforts* (see the appendix for further discussion). It produces a dynamic stream of Laban Basic Effort qualities in real time. This stream can be mapped to visual or sonic parameters for visualization, performance, interactive installation, or interactive gaming. We extend the use of EffortDetect by designing a visualization system that uses movement quality parameters to generate an abstract visualization for use in interactive installations or, in this case, dance performance. Previous computational systems that apply movement quality recognition [1, 2, 3, 4] have not been used in live artistic performance to the best of our knowledge.

Flow is a 5-minute improvised dance performance where movement qualities are extracted in real time from the performer's body using EffortDetect. These qualities are then visualized in a dynamic, evocative and meaningful way in real time. The visualization system maps the Basic Efforts to design rules, drawing parameters, and color palettes to create a meaningful visual representation which an audience can interpret in the context of human movement qualities.

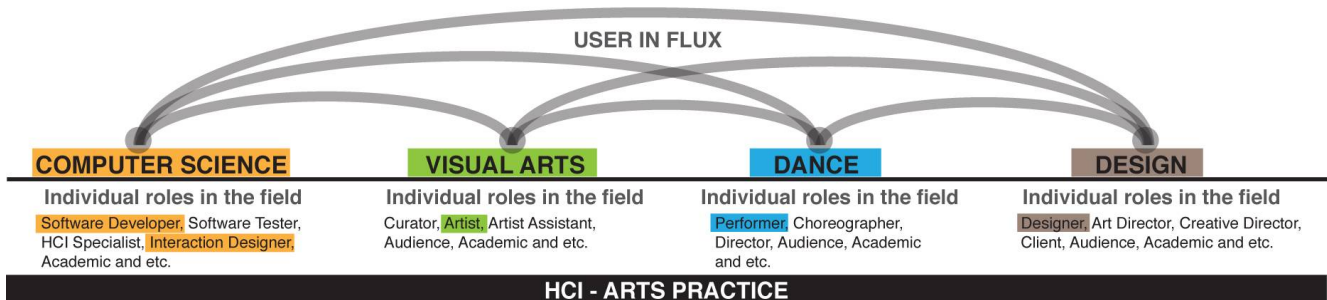


Figure 1. Shifting individual role among different fields during system development in HCI-Arts practice

Our research team was composed of individuals who possess expertise in multiple fields, including computer science, visual art, design, and dance. Our research focused on two general areas of inquiry: movement quality recognition and designing interactive visualizations. However, each researcher contributed to both research areas in various roles, including software developer, interaction designer, visual designer, performer, or system tester. The roles of each team member shifted during the different stages of project development. For instance, the software developer and the hardware engineer would also act as a user or performer by interacting with the system during system testing, while the dancer generated training data for the machine learning component of EffortDetect. In live performance, the dancer becomes a user of EffortDetect, an author of the resulting visualizations, and a performer on the stage. These three roles change simultaneously in performance in which performer enters a state of flux. During the development process, on the other hand, the dancer acted as a system trainer, a collaborator, and a system tester. The shifting roles allow the dancer to creatively and expertly use the system to generate

visualizations because she is already familiar with the relationship between EffortDetect and the visualization system. Figure 1 presents the shifting roles taken by our research team during system development. These shifting roles exemplifies the increasingly fluid disciplinary boundaries that practitioners of new media art contend with. From our perspective, these shifting roles provide advantages for both technical and artistic development because everyone on the team acted as user, artist, performer, or hardware and software developer through evolving interactions, exchanging knowledge and sharing experiences.

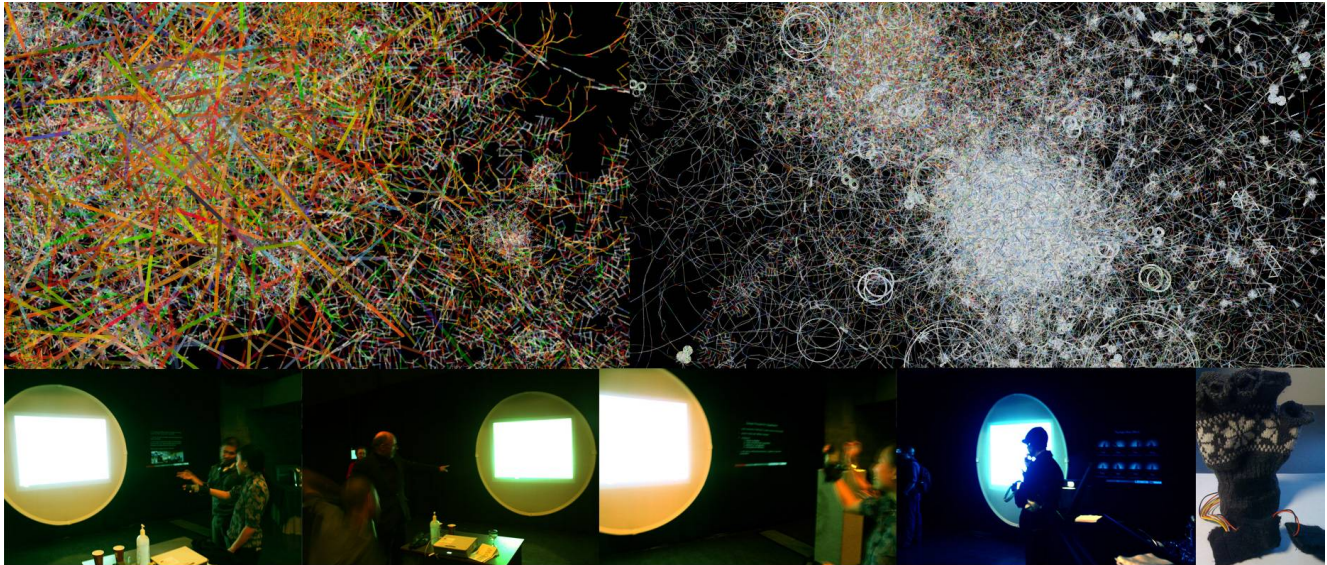


Figure 2. Paint with Your Efforts Interactive Installation

In October 2010, we exhibited an interactive installation entitled “Paint with Your Efforts ” at an evening event at the Surrey Art Gallery, Canada (See Figure 2). This installation presented a prototype of the interactive visualization system. In order to create an interactive visual response, we invited attendees of the event to use a wearable sensor glove to interact with the visualization system and to move with various qualities. They were also invited to interpret the meaning of the changes in the visualization based on the changes in their own movement. For *Flow*, we propose that at the end of the performance, we will encourage the participants to come onstage to interact with EffortDetect and explore the visual aesthetics, shifting their role from audience to user and author.

CONCLUSION

Our approach used live performance and development process to explore the concept of user in flux within HCI and artistic practice. From our perspective, this practice can lead us to expanded understanding of the concept of the user who constantly change roles or activities within the field of new media art practice and HCI. A user is not only a person who interacts, collaborates, manipulates, or performs via digital media but also a group of people who develop, design, and perform by interacting with an interface or a system. In this case, the user can also be a person who constantly negotiate or shift individual roles during the project development and live performance.

REFERENCES

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APPENDIX

1. Laban Basic Efforts

Ludolf Laban created a system for interpreting, describing and analyzing human movement called Laban Movement Analysis (LMA). In the LMA system, movement is analyzed within four frameworks: Space, Weight, Time and Flow. Laban Basic Efforts is a part of LMA used for analyze movement qualities (Effort) within three parameters, Space, Weight and Time. Space is either direct or indirect; Time is either sustained or sudden; Weight is either heavy or light. Unlike LMA, Laban Basic Effort use only three parameters which results in eight distinct combinations of values from the three parameters. Laban refers to these as the eight Basic Effort qualities (Table 1).

Weight	Space	Time	Corresponding Basic Effort
Strong	Direct	Sustained	<i>Press</i>
Light	Direct	Sustained	<i>Glide</i>
Strong	Direct	Sudden	<i>Punch</i>
Light	Direct	Sudden	<i>Dab</i>
Strong	Indirect	Sustained	<i>Wring</i>
Light	Indirect	Sustained	<i>Float</i>
Strong	Indirect	Sudden	<i>Slash</i>
Light	Indirect	Sudden	<i>Flick</i>

Table 1. The eight Basic Efforts.

2. Performance System Diagram

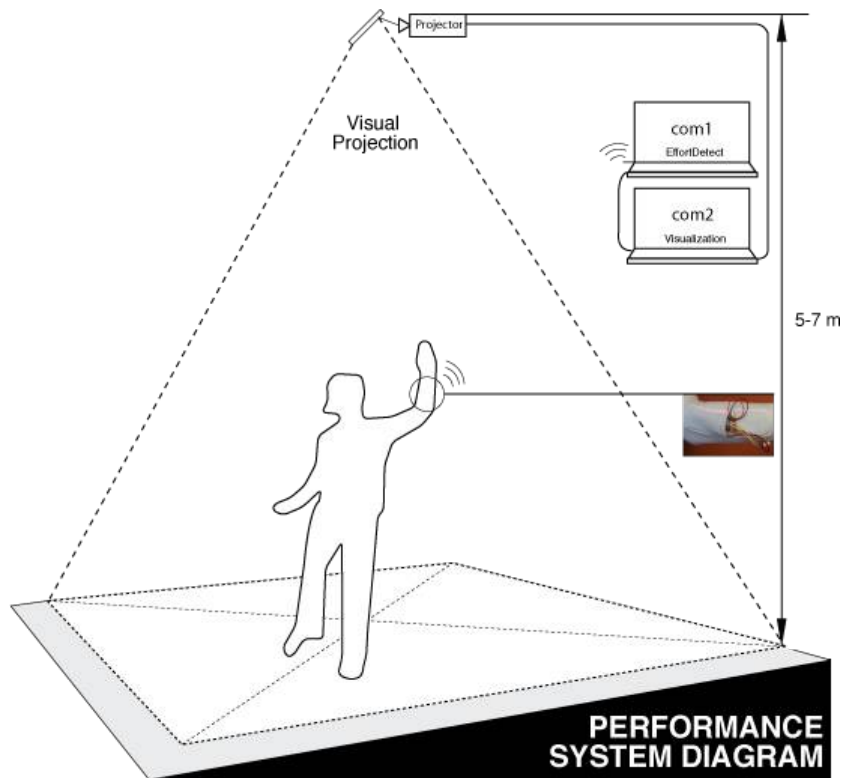


Figure 3. Performance System Diagram