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Kate Sicchio, PhD
Virginia Commonwealth University
ksicchio@vcu.edu

ABSTRACT

Programming paradigms such as imperative programming and declarative programming are often used to describe features of different programming languages. This paper uses these paradigms as a framework for discussing approaches to choreographic scores. It then discusses how these apply to the live coded dance performance Moving Patterns.

1. INTRODUCTION

This short paper aims to introduce how programming paradigms as described by Van Roy (2009) may also be extended to discuss rule-based performance practices, such as live coded dance and choreography. It will then discuss the dance piece "Moving Patterns" and how these programming paradigms may be applied to understand this intersection of coding and choreography.

When programming, paradigms are used to describe different features of programming languages. Van Roy states, "A programming paradigm is an approach to programming a computer based on a mathematical theory or a coherent set of principles. Each paradigm supports a set of concepts that makes it the best for a certain kind of problem" (2009). Paradigms may not be considered exclusive and languages may have multi-paradigm approaches. While if a taxonomy of languages is useful has been debated, this paper sees the paradigms of imperative and declarative programming as a potential framework for discussing how coding may overlap with choreographic scores and rule-based performances. It uses them as broad terms that provide an interesting starting point for understanding instructions, execution and performance in both code and dance.

2. IMPERATIVE PROGRAMMING

One approach to programming languages is the imperative paradigm. Watt and Findley (2004) describe imperative programming as commands that update variables. These languages tend to be thought of as instructions or how to proceed. They are statements of action and the outcome may be unknown. An example of this is the language C.

3. DECLARATIVE PROGRAMMING

On the other side of the spectrum is the declarative programming paradigm. Rather than giving an explicit set of steps, declarative programming defines what the program should accomplish. "Declarative programs, in turn, are made up of sets of definitions or equations describing relations which specify what is to be computed" (Coenen, 1999). While declarative programming may not know the way, it has an end goal.

4. CHOREOGRAPHIC SCORES

Within dance, there is also a broad range of systems of language for relaying information from a choreographer to a dancer. Scores may be given to performers via speech, text, visuals or other means and may be created before, during or after a performance. Many dance improvisation artists work from scores, or sets of guidelines or instructions meant to be interpreted in order to create movement in a given time and space.

Choreographer Jonathan Burrows (2010) discusses two approaches to dance scores, one being akin to a classical music score where there are clear instructions for a piece, but the other being an inspiration for a performer. "…what is written or thought is a tool for information, image and inspiration, which acts as a source for what you will see, but whose shape may be very different from the final realization." These two approaches echo ideas found in the declarative and imperative programming paradigms. This will be discussed more below in relation to the performance Moving Patterns.

5. MOVING PATTERNS

Moving Patterns is a recent work by the author, continuing explorations of the intersection of dance and live coding. The piece is a 15-minute long duet between a dancer and a live coder. It was first performed at Areté Gallery in April 2018 in Brooklyn, NY USA. Within this work a visual score for dance improvisation is created through the act of real-time programming. The aim of the piece is to create a feedback loop between the performer, who is improvising movement based on pictures projected into the performance space, and the live coder who is selecting the images as well as composing them in sequences in real-time. The images being used to create the visual score are from a library of photographs of a dancer (and in this case the live coder). It is a collection of thousands of time lapse photographs of movement. The performance score happens through live coding the system and the dance happens through the embodiment of the coded images. Together both the live coder and the dancer are collaborating to create a choreography and co-authoring the work live.

The piece has many layers that are happening simultaneously while being co-choreographed by a live coder and a dancer. The live coder is choosing and arranging images in real-time through the programming languages TidalCycles and DanceDirt (both based on Haskell). These create patterns both in terms of repetition of images and timing of the appearance of the image. The code and the resulting images are projected into the performance space for both the performer and audience to see. The dancer is viewing the images and patterns and rhythms are emerging from the algorithms the live coder is writing.

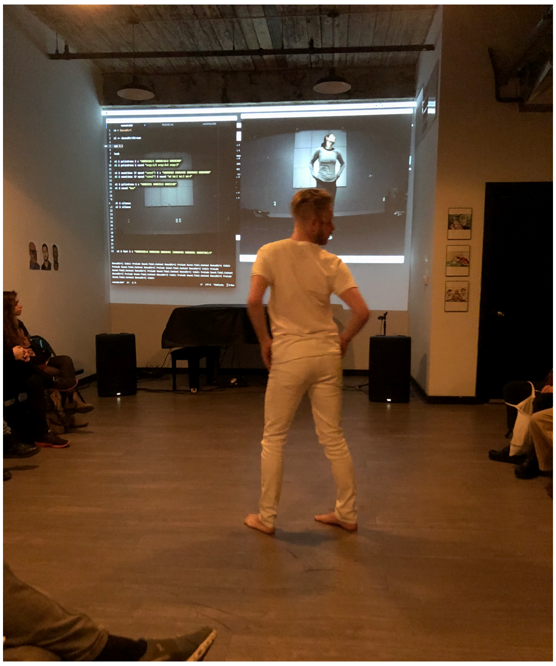

Figure 1. Performance of Moving Patterns, 2018.

6. PROGRAMMING PARADIGMS WITHIN MOVING PATTERNS

There is a clear similarity in both Van Roy's concepts of programming paradigms and Burrow's discussion of choreographic scores. There are both programming languages and scores that are step by step instructions, and others that are an application of parameters. Within Moving Patterns both imperative and declarative paradigms can be observed as ways for the score to be embodied and performed by the dancer, but with more opportunities for declarative approaches to be explored.

The beginning of the piece allows for an imperative approach to the choreographic score. The dancer has specific instructions to copy the images that are projected into the performance space. They must create the exact shapes that appear on the screen and match the timing, in a mickey mouse fashion. The dancer must repeat the shapes the exact amount of time they appear. Each step in presented as it is coded by the choreographer and then it is performed by the dancer.

But as the piece progresses more declarative aspects are not only apparent, but also encouraged. The dancer no longer is sharply moving from shape to shape but moving in between shapes. There are no longer specific rhythms or order of shapes to be followed. The goal is to make movement that embodies the photographs, but there is no instruction on how the dancer must approach this. The dancer uses the score as an inspiration or guide and develops their own interpretations further and further from the images, but still related through an execution of movement.

7. CONCLUSIONS

This paper serves as the beginning to a further discussion on how programming paradigms may be applied to understandings of the live coding of dancers through exploring declarative and imperative paradigms and choreographic scores. It specifically discusses the work Moving Patterns and how the performer may embody these programming concepts in performance.

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REFERENCES

Jonathan Burrows. 2010. The Choreographer's Handbook. Routledge: London.

Francis Coenen. 1999. Characteristics of Declarative Programming Langauages
http://cgi.csc.liv.ac.uk/~frans/OldLectures/2CS24/declarative.html#detail

Peter Van Roy. 2009. Programming Paradigms for Dummies: What Every Programmer Should Know. in *New computational paradigms for computer music*.

David A. Watt and William Findlay. 2004. Programming Language Design Concepts. John Wiley and Sons.