Sketch Game

Paul Clifton
Georgia Institute of Technology
583 Saint Charles Ave. Apt. 1, Atlanta, GA 30308
paulgclifton@gmail.com
404-542-9449

Ellen Do
Georgia Institute of Technology

ABSTRACT
This paper discusses Sketch Game, an abstract sketching game incorporating a custom deck of cards and a multi-touch tabletop computer, its rules, motivations, implementations, and its relationship to other similar work.

Author Keywords
Games, Sketching, Multi-touch, Tabletop computer, Collaboration

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
Sketch Game combines aspects of card games, such as Uno or Fluxx and aesthetic concepts of sketching on a multi-touch tabletop system to create a collaborative, non-competitive, non-goal-oriented game in which players work within constraints to create an aesthetically pleasing drawing. This game comes out of my interest in non-competitive gaming and collaborative tabletop sketching and is based on research about aesthetics and sketching concepts.

MOTIVATION
The motivation behind Sketch Game is two-fold: the development of a multi-touch tabletop sketching system, and the idea that a game can be made by placing a set of restrictions, or rules, on an action.

My master’s project, WorkTop, includes developing a collaborative, multi-touch tabletop sketching application to facilitate interdisciplinary brainstorming between designers. While sketching is only part of this interface, synchronizing the development of my master’s project with the design of my game gave me the opportunity to focus on the design of the game.

During early discussions of play and games, I landed on the idea that a game is essentially a scripted activity. I also became interested in the idea of non-competitive games. I wanted to create a game that relied on collaboration and did not have a winner or loser. By combining the idea of abstract art and aesthetics with a set of rules derived from elementary drawing instruction and composition theory I was able to make a set of rules that when applied to a developing sketch had the potential to produce a pleasing work of collaborative art.

RELATED WORK
The gameplay of Sketch Game is derived from Fluxx, a card game published by Looney Labs. In Fluxx, the game starts out without a goal and a simple rule set, draw one card and play one card on each turn. As the game progresses, players play goal cards and rule cards that change how the game is played. There are also Keeper cards that are used to achieve the goals, and action cards that dictate and action to take and only stay in play until the action is completed. Fluxx allows for very little strategy and often results in a player winning on accident, but as players learn the deck, they begin to create frameworks for their decisions. From Fluxx, I took the mutable rule structure and the idea of action cards. I created rule cards that apply to the composition of the sketch, such as reflect sketches over the X-axis, and action cards, which enable players to remove a rule or end the game.

Other inspiration for my game came from an old surrealist drawing game in which players fold a piece of paper in thirds and pass it around. Each player draws the top, middle, or bottom of a humanoid figure without looking at what the other players drew. When the paper is unfolded the entire creature is revealed with varying results. Artistic collaboration has a long history. Artists often come together to create pieces that enfold multiple skill sets and ideas, but often they require a framework to accomplish this work. For Sketch Game, I attempted to abstract a framework for sketching that allowed anyone to work together.

I derived part of this framework from Ed Emberley. In his drawing books, like Make a World, he abstracts items, like boats or cars, into component parts made of basic shapes and lines and then shows how to put those parts together to make the item. I took Emberly’s idea of parts as the basis for the act of sketching in my game. In Sketch Game,
players play cards that tell them to draw different shapes or lines, like pentagons or curves.

The sketching composition rules for Sketch Game came from a set of notes on aesthetic and visual concepts by Dr. Mickish and Dr. Jones, that my mom saved from her MFA at University of Georgia and education degree at Georgia State. The guidelines say things like, “Repetition is the repeated use of the elements, space, line, shape, mass, color, value, and texture.” While the guidelines do not provide a set of rules to follow to create a pleasing work, they do provide a framework of elements and how elements can relate to each other, that I was able to use to create at least part of a rule set to implement them. The relationships and elements I focused on are mostly location based due to limitations of time and technology. The rules could be extended, though, to take in to account color, texture, and other elements in the future.

**DESIGN AND IMPLEMENTATION**

The first stage of the design of Sketch Game was to develop the set of cards that would provide a balance between sketching and augmenting the rules. For this stage I wrote out all the rules, the shapes and lines, and the actions in a spreadsheet and used that list to make a deck of cards on index cards.

The next stage was play testing. I conducted paper based game sessions in both Design Games class and Synlab meeting. From these sessions, I received feedback about refinements to the cards, and comments about the structure of the game and other background work to think about. I made the changes to the deck; however, I kept the gameplay intact since I wanted to preserve the non-competitive and abstract aspects of the game. However, it is worth noting that several players wanted a goal or at least an initial framework for the drawing, like fill in the blank or connect the dots, to get them started, and this is something that could be implemented in the future as an extension to the original game.

The third stage was coding and testing. I built the game using the Reactivision engine and TUIO protocol on the multi-touch tabletop in Synlab at Georgia Tech. I used Processing to draw to the screen based on TUIO cursor objects. The rules that are handled by the table are tagged with fiducial markers, and the program applies the appropriate rules to the sketches depending on what cards are in play on the table. This takes the burden of following the rules off the player, so they are free to compose the sketch. The basic algorithm works as follows:

1. When the screen is touched get the coordinates of the touch, and create a new sketch object, which is an ArrayList of Vectors of point coordinates.
2. When the touch is updated, check for which rules to apply to the new point and apply them, updating the vectors in the sketch object.
3. Draw a line between each of the points in each of the vectors.

The program knows which rules to apply to which sketches by keeping track of an array of numbers that correspond to which rule cards are in play at the time of the creation of the sketch.

**DISCUSSION**

The following sections comment on the general placement of Sketch Game in the field.

**Contribution**

Sketch Game makes a novel contribution to collaborative tabletop gaming by combining card game like game play with a tangible object tracking and touch-based tabletop computing system. Tabletop computers are often used for collaborative games with objects, but up to this point I have not seen one that uses a deck of cards as the object. There are collectible card games played over networks that use markers to tell which cards are in play, like Eye of Judgement for Playstation systems, but these systems do not augment collocated collaborative play. Furthermore, object based games tend to rely on a single set of objects that go on the table, which are moved, but never removed. Sketch game allows tracked objects to be placed on and taken off of the table as the game progresses.

**Lessons, Challenges, and Issues**

The first lesson I learned from designing Sketch Game is that many people do not like collaborative, non-goal oriented, non-competitive games. Most people I tested appreciated the idea, but only after I explained it to them. I found this interesting, because children’s play is often non-competitive, and often involves the collaborative creation of stories, which, to me, is similar to the collaborative creation of abstract visual art. Research could be done in this direction to uncover when collaborative play becomes replaced by competitive play in childhood development and to understand how both modes of play could be nurtured.

The second lesson from Sketch Game came from solving a major code problem that I have struggled with on several occasions. Rotating a point around an arbitrary point on the screen turns out to be non-trivial. First, I had to understand that since the coordinate plane of a computer program uses and flipped y-axis, the trigonometric equations for rotation must be modified to calculate the correct coordinate. After figuring out these equations, I had to figure out how to use them for an arbitrary origin. The simplest solution to this problem turned out to be to translate everything to the real origin, perform the rotation, and then translate everything back to the correct coordinate. I think there is a better way to do this, but I have not figured it out yet.

One current problem, is that since I am modifying and drawing the sketch objects at the same time, I get a concurrent modification error sometimes when a sketch is
being updated and drawn. I solved this by catching the error, but I think I could solve it by drawing from a copy of the array of sketches instead of from the original, which would be a more robust way to handle the problem.

**Future Work**

The first thing I would like to do is to make a nicer set of cards. Index cards do not make the best play experience and the resolution of the fiducials on them is not ideal.

I would also like to implement more of the rules in code and provide a more robust way for adding new rules. Some of the rules have hardcoded pixel values for translation and rotation that I would like to make variable, either through playing cards or randomly generated.

Since there are many different games that can be developed using this concept, I may try to implement a version with a goal that is either generated from a card or randomly at the beginning of the game. Also, I could provide the framework so others can use it to create other games or drawing, and design tools even.

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**CONCLUSION**

Sketch Game synthesizes gameplay and aesthetic elements with multi-touch technology to create a novel, collaborative game that can be approached from different perspectives depending on the players and the context in which it is played. While non-competitive, non-goal-oriented games are not often played in this culture, they provide a worthwhile design space for exploring the relationship of rules and actions in a game setting, and depending on the players, they can provide and pleasant and fun framework for face-to-face interaction.

**REFERENCES**