

ANIMATED NOTATION AND SOL LEWITT: A STUDY OF COMPOSITIONS BY SMITH, HOPE AND YANG

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ABSTRACT

This paper looks at three animated scores based on the work of American conceptual artist Sol LeWitt (1928-2007): Ryan Ross Smith's "*Study no. 38 [Variations on Sol LeWitt's Variations of Incomplete Open Cubes]*" (2014), Cat Hope's "*Wall Drawing*" for string quartet, theremin and electronics (2014) and Justin Yang's "*LeWitt Notations I*" for improviser, live-generated animation/score and live electronics (2010). This paper provides a technical and artistic analysis of these works, and how each composer's respective approach to Animated Notation relates to LeWitt's work as well as his seminal 1967 paper, "*Paragraphs on Conceptual Art*".

1. INTRODUCTION

Animated Notation is a primarily 21st century approach to the representation of musical ideas. Unlike traditional notation, be it common practice or graphic, animated notation is necessarily dynamic: in order for it to be properly realized it must be in motion (Smith, 2016), and these scores are often presented using digital means and software (Hope & Vickery, 2011). Yet, despite the largely digital nature of these scores, there is a strong relationship between animated and graphic notations (Hope, 2017) just as there is between drawing and painting. The visual materials found in animated scores represent a wide range, but the symbols and associated functionalities are often basic, clearly prescribing what is expected of the performers (Smith, 2015). Yet, despite the prescriptive qualities of animated notation, the visual elements often reflect upon the history of graphic notation as well as certain trends in the visual arts. In the case of the three composers' works detailed below, the materials and processes inherent in the work of Sol LeWitt have clear connections to the visual and process aspects of their animated scores. This relationship between LeWitt's work and musical scoring and performance is not without precedence, for as Mette Gieskes notes: "LeWitt was highly aware of the novelty within the visual arts of his

wall drawings. The notion of a work that was based not only on a predetermined system but also on performativity and infinite repeatability was as common in the field of western music as the notion of a painting in the visual arts." (Gieskes, 26). In regards to his Wall Drawings specifically, LeWitt states that "I think of them like a musical score that could be redone by any or some people." (Gieskes, 27). This relationship is clear in that LeWitt's instructions require participation by the performers, or artists as it were, for their realization. But

while LeWitt exploits this shifting of agency that is generally reserved for the artist alone, he does so in such a way that the results still represent the concept with a high degree of specificity. This is due in part to the limitations placed on his materials, generally favoring simple shapes and instructions to realize an equally-distilled concept or "idea":

When an artist uses a conceptual form of art, it means that all of the planning and decisions are made beforehand and the execution is a perfunctory affair. The idea becomes a machine that makes the art. This kind of art is not theoretical or illustrative of theories; it is intuitive, it is involved with all types of mental processes and it is purposeless. It is usually free from the dependence on the skill of the artist as a craftsman... What the work of art looks like isn't too important. It has to look like something if it has physical form. No matter what form it may finally have it must begin with an idea. (LeWitt, 1967)

For instance, in LeWitt's *Wall Drawing #45*, the instructions are short and concise: *Straight Lines 10"* (25 cm) long, not touching, covering the wall evenly (see Figure 1). While the location of each line is determined by the artist in charge of realizing LeWitt's instructions, the specificity of the materials (10" long straight lines) and their spatial relationships (covering the wall evenly) indicate various realizations of an otherwise singular idea.



Figure 1 *Wall Drawing #45* (1970)

As stated earlier, the shapes and symbols found in animated scores often follow in similar fashion, and the reasons for this are pragmatic: the animated score emerges in real-time, and thus, the notation must be legible in real-

time. This emerging or becoming of the notational information in real-time is often based on some fixed, generative or performative process (Smith, 2016), and like LeWitt's work, these process(es) are designed to represent the musical idea.

LeWitt alludes to ideas as problems to be solved, not dissimilar to how a programmer develops his or her code. In this sense, a problem may represent a field of possibilities, solutions, or a "plan" that may suggest generative structures through which these possibilities can be navigated.

The plan would design the work. Some plans would require millions of variations, and some a limited number, but both are finite. Other plans imply infinity. In each case, however, the artist would select the basic form and rules that would govern the solution of the problem. (LeWitt, 1967)

In addition to containing the rules for the realization of an idea, the plan will also describe the means for generating the work's internal building blocks, a vocabulary and grammar of sorts, upon which the idea can be realized. In *Wall Drawing #45*, the primary building block is a single 10" straight line. The characteristics of the line and the instructions that indicate its use in the final realization is the foundation for the generation of complex forms.

When an artist uses a multiple modular method he usually chooses a simple and readily available form. The form itself is of very limited importance; it becomes the grammar for the total work. In fact, it is best that the basic unit be deliberately uninteresting so that it may more easily become an intrinsic part of the entire work. Using complex basic forms only disrupts the unity of the whole. Using a simple form repeatedly narrows the field of the work and concentrates the intensity to the arrangement of the form. This arrangement becomes the end while the form becomes the means. (LeWitt, 1967)

While LeWitt originally realized these works himself, he later began working with assistants who took over the process completely. For example, to begin making *Wall Drawing #260*, LeWitt's long-time assistant Anthony Sansotta and his team first generated a vocabulary of elements based on the instructions followed by the creation of their combinatorial possibilities. (see Figures 2 and 3). The walls were then divided into a virtual grid, and a team of artists drew the cells to realize the work. (see Figure 4).

In regards to animated scores, the "team" often resides within the computer code that generates the notational symbols and functionalities, as well as the performers who eventually realize the score.

The three works detailed below represent a reflection on the visual characteristics, processes, and prescriptive qualities of Sol LeWitt's work outlined above. While each composer approaches the impact that Sol LeWitt's work

has had on their respective composition differently, there are thematic similarities across all three works.

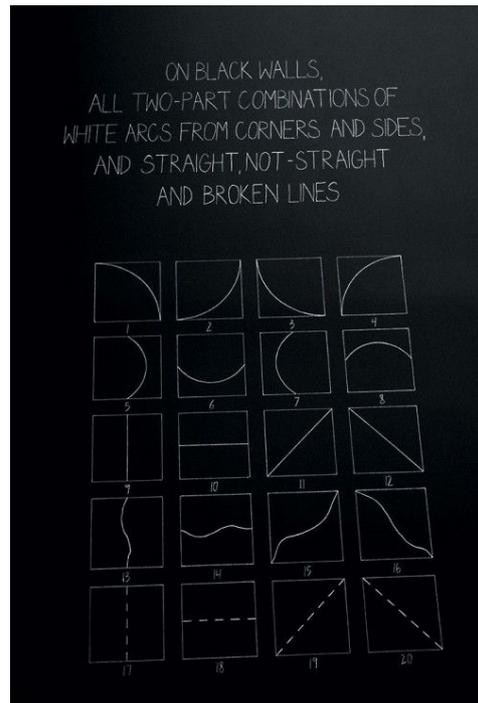


Figure 2 Sol LeWitt *Wall Drawing #260*, 20 base elements.

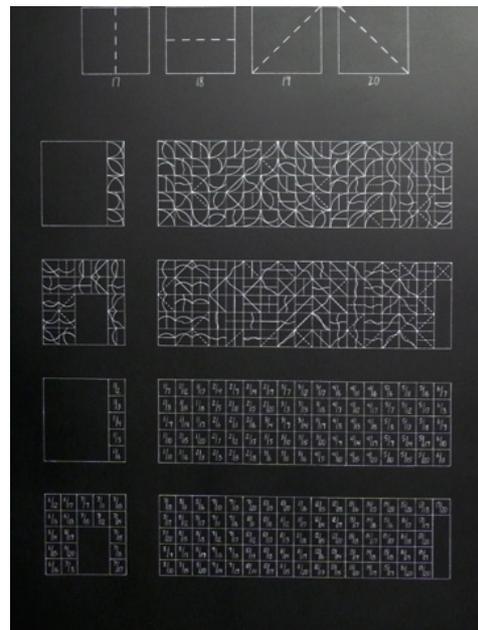


Figure 3 Sol LeWitt *Wall Drawing #260*, 190 possible combinations of base elements.



Figure 4 *Wall Drawing #260* (1975). On black walls, all two-part combinations of white arcs from corners and sides, and white straight, not straight, and broken lines.

2. THREE WORKS

2.1. Study no. 38 [*Variations on Sol LeWitt's Variations of Incomplete Open Cubes*] by Ryan Ross Smith

Study no. 38 [Variations on Sol LeWitt's Variations of Incomplete Open Cubes] is based on the Sol LeWitt work *Variations of Incomplete Open Cubes* [1974]. In LeWitt's diagram/instructions for the piece, each of the 122 incomplete cubes is missing one or more edges, while the remaining edges are connected to one another at what would be the corners of the cube. The result is a finite set of variations, limited by the physical characteristics of a cube. Yet, because the complete cube is absent, it can be read as a set of variations without a tangible theme. The *theme*, as it were, is the complete concatenation of incomplete cubes without what LeWitt refers to as the "emotional kick" of a thematic bookend: there is no payoff in the conventional sense. (LeWitt, 1967) It is this *incompleteness* of the work, when considered in the traditional theme and variation context, that puts the focus on the differences between variations, rather than extensions of some thematic material. At the time of its composition, Smith was interested in constrained sonic palettes, while exploring the combinatorial possibilities of iterative and generative systems, and LeWitt's instructions were used as a template to control the micro and macro form of the animated score.

Smith approached LeWitt's instructions for *Variations* as a readymade graphic score that was calling out for dynamic intervention of a notational sort. In LeWitt's instructions, the final image, 11/1, is the most complete of the cubes, missing only one edge, and indicating seven points of intersection between the edges. In the animated score, these seven points represent the seven performer-determined sounds. Each point, or node, is activated by the arrival of an attack cursor, and the attack cursor can only travel to target nodes connected by a line to the active node (Smith, 2016). By limiting the sonic palette to 7 sounds throughout all 122 variations, the differences between each variation are highlighted, as they are

dependent on what nodes are present, and in what way they are connected.

Figure 5 is a screenshot of Variation 6, modelled after LeWitt's Variation 4/3. If read on a clock face, active nodes are present at 4, 6, 8 and 10 o'clock, as well as the center node. The attack cursor, which indicates to the performers what sounds to play and when to play them, is restricted to these nodes and their respective pathways. For instance, after an event is indicated at the 10 o'clock node, the only nodes that could follow include a repeat of the same node, or the node at 8 o'clock. From the node at 8 o'clock, the cursor may travel to the center node, the node at 6 o'clock or the node at 10. In Figure 6, while all nodes are active, the attack cursor is still constrained by what pathways are present: in order to get from the node at 10 o'clock to 6 o'clock, the cursor would need to pass through all remaining nodes.

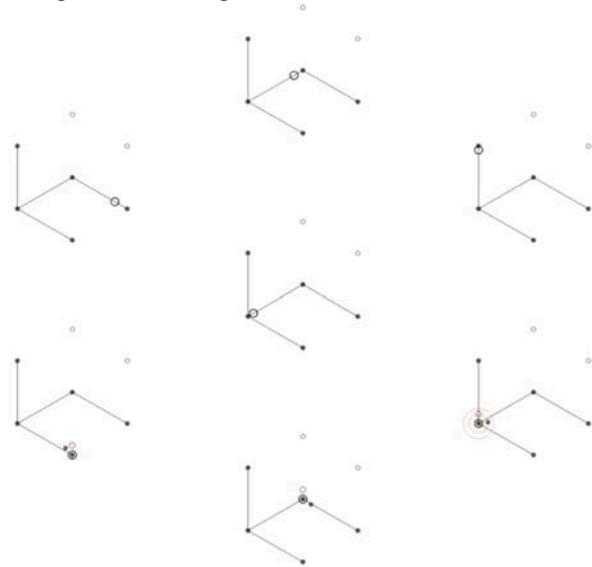


Figure 5. *Variation 4/3 [Variation 6]* features 5 active nodes with lines to indicate possible cursor movement.

The movement of the attack cursor from node to node, including speed, direction, and whether or not the current node is repeated, is determined by a simple random process at the completion of each event.

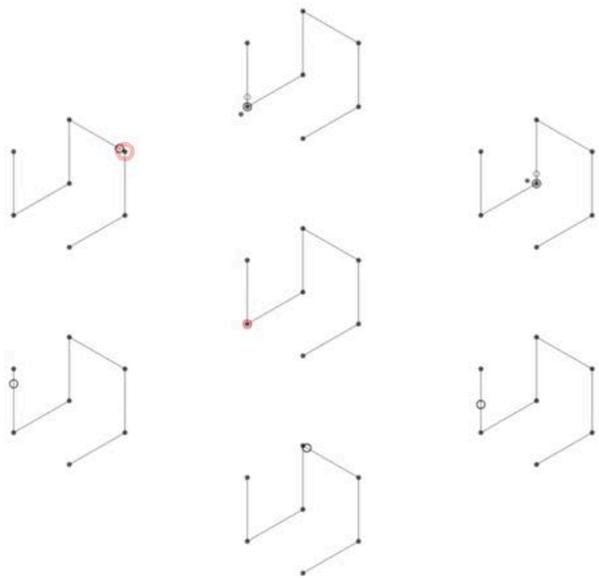


Figure 6. *Variation 6/8 [Variation 30]* features 7 active nodes with lines to indicate possible cursor movement.

2.2. *Wall Drawing* by Cat Hope

Wall Drawing was originally composed for Theremin and six mixed instruments for the Icelandic collective S.L.A.T.U.R. It was then adapted for string quartet, Theremin and electronics for the Zephyr Quartet and premiered by them in Adelaide, Australia in 2014. Of the three works in this paper, *Wall Drawing* represents the most abstract link to LeWitt’s work, despite its very literal title referencing the series of works known as the *Wall Drawings*. The work is notated using different colours for each instrument, with the string quartet represented by the colours red, blue, green and purple. The primary nature of the colours is a direct reference to LeWitt’s colour choices. The string part of the score, as in many of Hope’s works, is characterised by long drone tones, where the bowing of the string instruments should be imperceptible, and often connected with glissandi sections as seen in Figure 7. The Theremin part, indicated in yellow, is more dynamic, but similarly characterised by drones and glissandi, referencing Percy Grainger’s notated Theremin works *Free Music No.1* (1936) and *Free Music No. 2* (1937). For the electronic part, notated in grey, the only instructions are where to start and stop playing, with some dynamics indicated. The nature of the electronic sounds is open to the performer discretion. Unlike the string part, which has very soft and very loud sections, dynamic shading is indicated by the thickening of the Theremin and electronics line.

The score is proportional: the top of the page is the highest note, the bottom is the lowest. Thus, performers need to listen carefully to each other. They choose their first note, and reference this choice throughout the work, with the assistance of opaque, coloured and dashed ‘guide lines’ in the same colour as their own part. These assist performers in recalling the first pitch they chose as the score scrolls out of view, and the first few thirty seconds of the piece

are no longer visible, as the score scrolls out of view. The performers must keep in mind the pitch placements of the other instruments around them. This division, direction and combination of parts references the principles outlined in LeWitt’s article “Paragraphs on Conceptual Art” (LeWitt, 1967), but also the verbal instructions provided for the series of *Wall Drawing* paintings, such as those for *Wall Drawing #264*:

A wall divided into 16 equal parts with all one-, two-, three-, and four-part combinations of lines in four directions and four colours (Guggenheim)

The score provides these same instructions for sound making, but in a sense, reverses the process. The drawing is the instruction, not the actual artwork, nor the final result. Hope here conceives and plans the musical work, just as LeWitt did his paintings. As with LeWitt’s *Wall Drawings*, different versions of the piece will exist over time, none of them will be identical, given that the performers choose their pitches differently each time, and perform in different architectural spaces. The electronic part is also rendered differently by each performer.

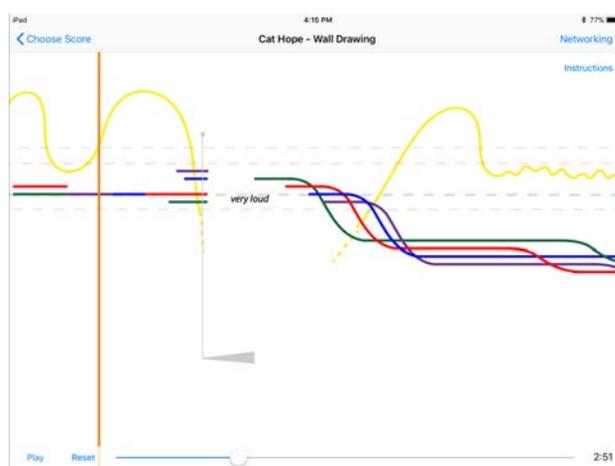


Figure 7. An iPad screenshot of an excerpt of Hope’s *Wall Drawing*, showing the guide lines that represent the starting pitches for the string quartet, and the playhead (the vertical line to the right), that coordinates the performers. The image passes this line as it moves from right to left. The slider at the bottom of the page shows at what point in the piece the screen shot was taken.

The score is presented to performers in the Decibel ScorePlayer, an iPad application that puts the score in motion, effectively rendering it animated (Hope, Vickery & Wyatt 2015). Presenting the score in a digital format makes the colour easier to reproduce and share, but also ensures that a performance of the score can be coordinated between the different performers individual iPads. The ScoreReader application enables the iPads to be networked together, meaning they move at the same rate – with the score image passing by a ‘playhead’ (a vertical line that signals the point of reading for the performers, ensuring coordination of the ensemble). The application also provides an instructions tab at the top right, that when

opened, provides the legend for the notation as well as the program note for the piece, as shown in Figure 8. The score also exists in hard copy, for musicological study, as the entire score cannot be seen on the iPad screen at once, although users can preview the entire score by pulling along the slider on the bottom of the screen.

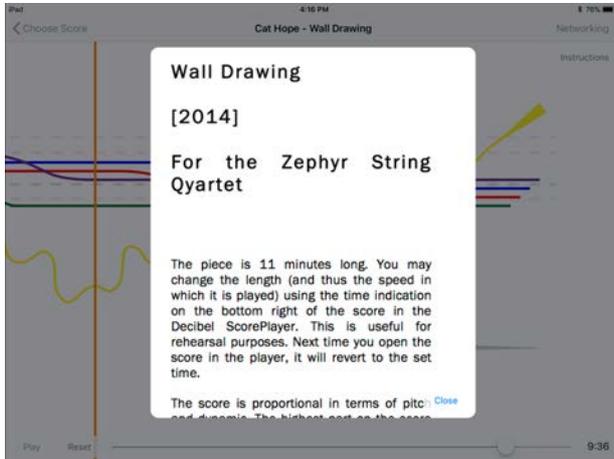


Figure 8. The pop up Instructions menu as it appears on the Decibel ScorePlayer on the iPad. The user can scroll down using the touch screen interface to read more. The Networking tab at top right provides information about what, and how many iPads are on the network together.

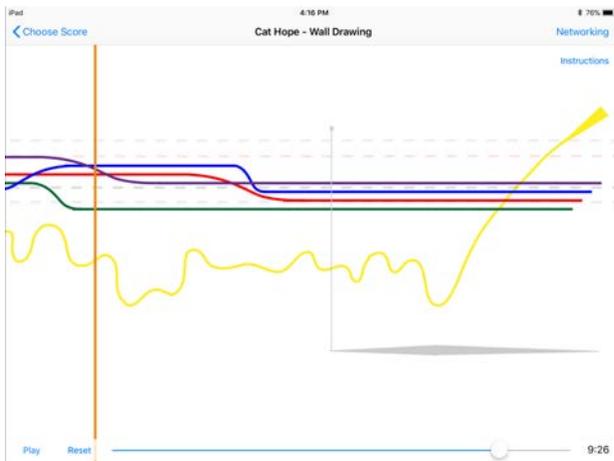


Figure 9. A screen shot of Hope's *Wall Drawing* showing dynamic increases in the Theremin and electronic parts. It also shows how far away from the original pitches the string quartet have come.

The work has a kind of sonic flatness that reflects the aesthetic of the score. In other words, it looks a lot like it sounds. The steady, slowly changing, yet always unified string quartet contrasts the relatively active Theremin part. The electronic swells always start very quietly, as if they come from nowhere (See Figure 9). The string quartet parts look like a broken Sol LeWitt Wall Drawing, and the musicians approach the score in a way that is similar to the 'assistant's' assembling LeWitt's paintings from text instructions, and the approach does not enable any overt musicality such as phrasing or emotion.

2.3. *LeWitt Notations I* by Justin Yang

LeWitt Notations I (See Figure 10.) is a work for solo performer, live-electronics, live animated score, and real-time score performers, based on Sol LeWitt's work *Wall Drawing 273* (1975). The instructions for *Wall Drawing 273* are as follows:

Lines to points on a grid. A six-inch (15cm) grid covering the wall. Lines from the corners, sides, and center of the walls to random points on the grid. Composite (seventh wall): red lines from the midpoints of four sides, blue lines from four corners, yellow lines from the center.

This work originates from a project to translate some of LeWitt's *Wall Drawings* into computer code, as it appeared that many of the instructions for LeWitt's conceptual work resembled interesting and concise algorithms. Code was developed to realize LeWitt's *Wall Drawings* using computer graphics, and the graphics were animated as if the LeWitt piece were being drawn in real-time. In the animated version of *Wall Drawing 273*, there is a richness of information for the instrumentalist. There are three different colors of lines being drawn, each of which can be interpreted as different motives, materials, or styles of playing.

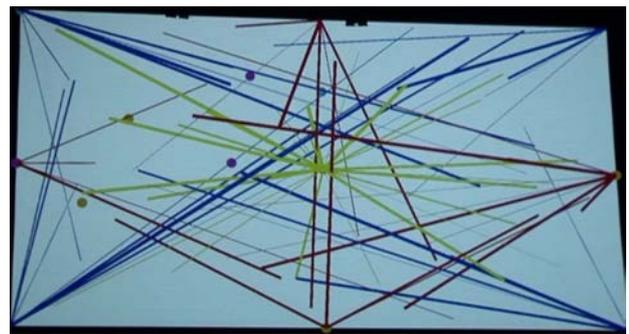


Figure 10. Sol LeWitt's *Wall Drawing #273*, real-time animated realization with computer graphics.

The speed of each line is random, and each follows a different trajectory. As the drawing progresses, the lines begin to intersect each other, and each intersection is a performance opportunity. The drawing/score is not necessarily being animated one line at a time so a multiplicity of events is possible. The moment the line reaches its final destination is also a potential performance event. In this version, the destinations are marked while the line is being drawn so that the performer can predict the moment of arrival. These performance cues are also being used for the live-electronics, as samples are triggered when line drawing begins, when lines intersect, and when lines reach their destination.

This animated realization of *Wall Drawing 273* is a type of natural graphic algorithm that produces unique and interesting rhythms. The real-time realization of the wall drawing also engenders an interesting formal structure of gradual and continuous transformation as the score becomes increasingly dense, and events become more frequent.

The realization of the wall drawing is facilitated by score performers, and the drawing of the individual lines is triggered by these performers. Each origin point has a different performer (lines from the corner, sides and center of the walls). A final performer controls the live electronics and manipulations of the score. The code, the computer animated graphics, and the structure of multiple distributed performers creates a kind of performance ecosystem through which this piece is realized.

In *LeWitt Notations I* (see Figure 11.) the realization of the wall drawing forms the first part of the piece. Once the drawing is complete, it presents as a rich graphic score object. In the second half of the piece, *LeWitt Notations I* uses various animated devices to explore this score object. One device is the use of black bands that mask out various parts of the wall drawing. Subsequently, animated cursors are deployed, a vertical and horizontal one, which intersect parts of the score and provide a temporal structure to engage with different areas of the wall drawing. The interactions between the cursors and unmasked parts of the wall drawing form the score for the second part of the piece both for the instrumentalist and live-electronics. The score performers now control changes in the masks and the cursors. Finally, in the third part of the piece, the drawing of the lines from the first section is reversed and the lines retract back to their points of origin.

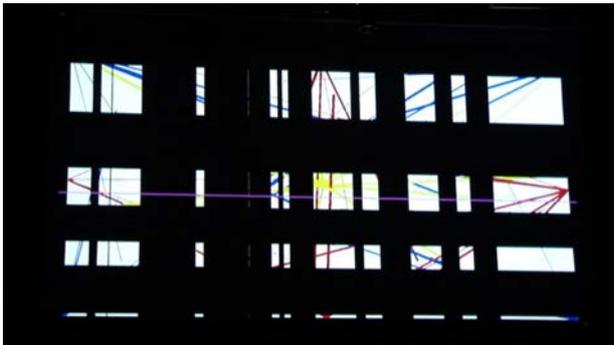


Figure 11. *LeWitt Notations I, Section 2: Wall Drawing #273* as graphic object, interpolated with masks and cursors.

The score for *LeWitt Notations I* is continuously evolving and reflects the fact that there is no one goal or ideal state: as one part completes it becomes the subject of further transformation. Because of this transformation, the performers must change how they approach the score and modify their performance strategies. The piece becomes less about realizing a sound image or graphic object, and more about the process of transformation incited by the wall drawing instructions, the computer code, and the progression of score development. The art work or object then lies as much in the concept (i.e., code, performance structure, score transformation situations), the evolution of the score, and the different modes of engagement that performers must navigate through, as any final sound object or graphic realization. As LeWitt sees it, the object(s) of Conceptual Art encompasses the concept as well as all the steps involved in realizing the concept.

If the artist carries through his idea and makes it into visible form, then all the steps in the process are of importance. The idea itself, even if not made visual, is as much a work of art as any finished product. All intervening steps –scribbles, sketches, drawings, failed works, models, studies, thoughts, conversations– are of interest. Those that show the thought process of the artist are sometimes more interesting than the final product (LeWitt 1967).

3. CONCLUSION

The compositions detailed above by Smith, Hope and Yang demonstrate the influence that the work of Sol LeWitt has had on their work. While these compositions are associated by their use of animated notation in a general sense, more specific linkages exist in the visual, prescriptive and process-based domains respectively.

Each score draws on the visual characteristics of Sol LeWitt's work, from the explicit use of the *Incomplete Cubes* in Smith's *Study no. 38*, to Hope and Yang's reflections on the *Wall Drawings*. More specifically, each score uses a collection of simple symbols to create a cohesive and complex sonic result. Smith's *Study No. 38* employs LeWitt's concept that "the basic unit be deliberately uninteresting so that it may more easily become an intrinsic part of the entire work" (LeWitt 1967) to create a constrained sonic palette and focus in on the patterns of variations indicated by LeWitt's instructions. Each variation presents a new process to move between nodes that is based on the incomplete cube pattern, and the arrival of nodes clearly prescribes what is expected from the performers. A performance of Hope's *Wall Drawing* is analogous to a real time drawing of one of LeWitt's *Wall Drawings*. Material is generated through the intersection of the various instrumental parts, while prescribing performer interaction based on their horizontal and vertical position. In Justin Yang's score, material is generated through the visual algorithm of the animated drawing of lines and their intersections. Yang literally draws *Wall Drawing #273* in real time, but then establishes it as a static object for further external transformations. This process introduces new modes of performance practice as the work progresses.

Each composition presented here draws on the particular generative model that is so prevalent in LeWitt's work: Start with a constrained set of base materials, and iterate these materials through a narrowly defined set of procedures to create complex, unpredictable yet prescribed formations. This model perpetuates through all aspects of the compositions, from material generation to textural considerations and formal development.

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