Please Come Home: A Data-driven Composition for Ultraleap's Leap Motion Controller, Cycling '74's Max/MSP, Symbolic Sound's Kyma, and Quadraphonic Speaker Configuration

by

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A dissertation accepted and approved in partial fulfillment of the

requirements for the degree of

Doctor of Philosophy

in Data-driven Music Performance & Composition

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Spring 2026

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DISSERTATION ABSTRACT

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Doctor of Philosophy in Data-driven Music Performance & Composition

Title: Please Come Home: A Data-driven Composition for Ultraleap's Leap Motion Controller, Cycling '74's Max/MSP, Symbolic Sound's Kyma, and Quadraphonic Speaker Configuration

Please Come Home is a data-driven composition for Ultraleap's Leap Motion Controller, Cycling '74's Max/MSP, Symbolic Sound's Kyma, and quadraphonic speaker configuration. The work is a setting of three "Please Come Home" messages from the back pages of the *Los Angeles Free Press*, an independent and staunchly anti-establishment newspaper based in Hollywood, which ran from 1964 to 1978. In these messages, appearing on the same pages as ads for swingers' retreats and drug paraphernalia, scared and desperate relatives beg their runaway loved ones to come home. Through music, I seek to paint a vivid portrait of these writers and their addressees, revealing their hopes, anxieties, and fears. Ultimately, I aim to show that, while each message has arisen from a rupture in a relationship, everyone involved is driven by the same, timeless desire for connection. This dissertation includes audio/video documentation of *Please Come Home*, software materials necessary for a performance of the piece, and this text document, which provides general information about the composition and my process, as well as a deeper investigation of several key musical areas.

ACKNOWLEDGMENTS

I wish to express my sincere appreciation to my committee members—Dr. Jeffrey Stolet, Dr. Jon Bellona, Dr. Wonkak Kim, and Professor Colin Ives—for their invaluable guidance throughout the preparation of this dissertation. I also gratefully acknowledge Dr. Akiko Hatakeyama, my "fifth" committee member, whose knowledge and mentorship provided a constant source of inspiration.

I would like to extend a special thank you to Dr. Jeffrey Stolet, my primary mentor during my time at the University of Oregon, who has profoundly shaped my approach to music and provided unwavering support through both the highs and lows of this journey. Through his mentorship, I have grown in ways I could never have imagined, and I look forward to learning from him in the years to come.

I am also deeply grateful to Dr. Chi Wang for inspiring in me a love of electroacoustic music and for helping me believe that I could pursue this work professionally. Without her encouragement, I would not be where I am today.

I would like to thank Dr. Tao Li. We progressed through much of our degrees, including our dissertations, at the same time and she has provided immeasurable musical inspiration and moral support. I am also appreciative of her assistance in filming the audio/video component of this dissertation.

I am profoundly grateful to my parents, who encouraged me from the very beginning to create freely and follow my instincts—and for so much more beyond that. I also thank my brother, Henry, my greatest champion.

Finally, I would like to thank my cats, Coconut and Kiwi, for their daily reminders that my self-worth is not measured by academic achievements, but solely by the number of tasty treats I give them.

DEDICATION

For Tina, Lenny, and Gail.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	10
II. COMPOSITIONAL STRUCTURE	14
III. DATA-DRIVEN INSTRUMENT STRUCTURE	17
IV. TEXT-SETTING STRATEGIES	24
V. INDETERMINACY AS METAHPOR FOR ANXIETY	32
VI. PERFORMATIVE ACTIONS AS SYMBOLIC GESTURES	39
VII. SUMMARY	44
BIBLIOGRAPHY	46

LIST OF FIGURES

Figure Page

1. Scans of the three "Please Come Home" messages 14

2. Data routing between the four components 18

3. Leap Motion Controller with the x-, y-, and z-axes labeled 19

4. Leap Motion “interaction area” 19

5. The “ultraleap” object receives data from the Leap Motion 21

6. LH.PosY subpatch showing various mapping strategies 21

7. HandDis subpatch 22

8. The Sample object editor window in Kyma 23

9. Comparison of a common Hanning window 25

10. Entire “music” sound structure 25

11. The SoundToGlobalController which outputs !TATrig 26

12. The sound structure used to calculate the delta of the combined velocity 27

13. Right hand y-position (RH.PosY) is mapped 27

14. (a) An aerial view of the performer 28

15. Tina Voice 010 sound structure 29

16. Example of an Capytalk expression 32

17. Comparison of two trigger-generating Capytalk expressions 33

18. A Kyma Multisample object 34

19. White noise sent through a series of band-pass filters 37

20. Frame captures depicting performative action 41

21. Hand rotations along the x-axis 42

22. Frame captures showing how far I extend my hand for each trigger..... 43

CHAPTER I

INTRODUCTION

The *Los Angeles Free Press*, or *Freep*, was an independent and staunchly anti-establishment newspaper based in Hollywood, which ran from 1964 to 1978.[1] While the front pages of the *Freep* charted the era's political and cultural revolutions, running headlines such as "War Strangled by Long Hair" (Metzger 1) and "The Capture of Tim Leary" (Kunkin 1), a more revealing document of the time was hidden in the back pages.

Aptly nicknamed "The Unclassifieds" by *Freep* founder and long-time editor-in-chief Art Kunkin (Sweet 3), the advertisements in the back pages read as a carnivalesque portrait of life in Los Angeles during the 60s and 70s. There are advertisements for strip clubs, swingers' retreats and sex of every kind; ads for mind-expanding manuals, new religions, and grow-it-yourself marijuana kits; ads for military draft counseling, political bumper stickers and button shops; ads that promise to reveal the truth about the Kennedy assassination and ads that promise to reveal the truth about *you*. And, printed alongside calls for nude models and live-in secretaries, there are scores of postings in which scared and desperate relatives beg their runaway loved ones to come home.[2] In his 2023 archival publication of the *Freep's* classifieds, *Please Come Home: Back Pages of the L.A. Free Press 1966-1974*, Sam Sweet titles these personals the "Please Come Home" messages (4).

[1] While the *Los Angeles Free Press's* 1964-1978 run was its most influential, there were a number of unsuccessful revivals of the paper, the last of which ceased operation in 2007.

[2] The majority of the "Please Come Home" messages seem to have been written by parents and addressed to their children. However, there are exceptions. Some seem to be written by grandparents to their grandchildren, some by aunts and uncles to their nieces and nephews, some by husbands to their wives (one example of this last type, "Tina Louise," is included in this dissertation). In this paper, I will use "relatives" or "writers" to refer to the group of people who penned these messages, and "loved ones" or "addressees" to refer to the group of people to whom these messages were written.

These stories of fractured families were not unique to Southern California. The 60s and early 70s saw a significant increase in the number of runaways across the United States. Among the many factors that led to this uptick was the growing hippie movement, which inspired runaways to flee the perceived shackles of their nuclear families for countercultural havens such as San Francisco's Haight-Ashbury, New York's Greenwich Village, and Hollywood's Sunset Boulevard (near the *Freep's* offices).[3] In his article on the subject, Benjamin Ramm estimates that over 500,000 people left their homes for these "experimental communities."

1971 marked the peak of this migration. Public concern for runaways had grown, kindled, in large part, by newspaper reports highlighting the dangers they faced. Two particularly sensational stories were Dean Corll's serial murders of at least twenty-nine teenagers and young men in Houston, Texas from 1970-73,[4] and the Symbionese Liberation Army's kidnapping of publishing heiress Patricia Hearst in 1974 (Moses 232). Galvanized by the public's response to these, and similar, stories, Congress passed the Runaway and Homeless Youth Act in 1974, which "[authorized] the provision of grants and technical assistance to local communities and nonprofit agencies to develop social services and temporary care, including housing, for runaways" (Moses 233). "Whether by consequence or coincidence," Sweet notes, "the 'Please Come Home' messages in the Free Press tapered off shortly thereafter" (5).

The phenomenon of hippie runaways was well-documented during this period, from scores of newspaper articles to artistic representations, such as The Beatles's "She's Leaving Home" and Gerome Ragni, James Rado and Galt MacDermot's rock musical *Hair: The*

[3] While the "generation gap" is often cited as the primary impetus for teenage runaways during this period, this, often fantastical, story of youths liberating themselves belies a harsher reality. In her 1978 study, "The Runaway Youth Act: Paradoxes of Reform," Anne B. Moses writes that "Not a few [runaways] are seriously troubled and run away from situations of physical or sexual abuse" (229).

[4] Moses notes that while "most of the boys had been classified as runaways by the Houston police… in some cases their parents had only reported them missing" (242).

American Tribal Love-Rock Musical, both from 1967. Yet the "Please Come Home" messages from the back pages of the *Freep* are unique, in large part because of a tension between the emotions they express and the form of these expressions.

The "Please Come Home" messages are examples of ephemera. The writers wrote anonymously and had no expectation that their words would ever be, as Sweet notes, "saved, let alone searchable" (5). The writers had no sense of a wider readership, no literary pretensions, no eye towards posterity. Instead, they wrote from the heart, revealing their pain with remarkable frankness and unsubtle urgency. The messages are, at times, disarmingly raw.

In contrast to the emotional immediacy of the messages, however, they possess a formal quality. Constrained by the price (an ad cost "$1.00 for the first line and 50 cents for each additional") (Sweet 3), the authors had to resort to an economy of means. In how few words could they express their longing? In how few words could they make their loved ones feel their pain, their understanding, their continued love? In how few words could they convince their loved ones to reverse a sizable life decision, to trust them again, to come home?

At times, the emotions expressed in the messages feel too powerful for their small textual containers, threatening to overflow into adjacent classifieds, and ultimately off the page. At other moments, these textual containers act like diamond presses, compressing the emotions within into sharp, tightly structured gems. In either case, this tension is deeply affecting, heightening the sense of anxiety that both the relatives and their loved ones must have felt. In this way, the "Please Come Home" messages transcend historical oddity to become powerful poems of longing.

This dissertation, also titled *Please Come Home*, is a musical setting of three of the "Please Come Home" messages for Ultraleap's Leap Motion controller, Cycling '74's

Max/MSP, Symbolic Sound's Kyma, and quadraphonic speaker configuration. Through music, I seek to paint a vivid portrait of these writers and their addressees, revealing their hopes, anxieties, and fears. Ultimately, I aim to show that, while each message has arisen from a rupture in a relationship, everyone involved is driven by the same, timeless desire for connection.

This dissertation includes audio/video documentation of *Please Come Home*, software materials necessary for a performance of the piece, and this text document, which provides general information about the composition and my process, as well as a deeper investigation of several key musical areas. The sections are as follows: 1) Introduction, 2) Compositional Structure, 3) Data-driven Instrument Structure, 4) Text-Setting Strategies, 5) Indeterminacy as Metaphor for Anxiety, 6) Performative Actions as Symbolic Gestures, and 7) Summary.

CHAPTER II

COMPOSITIONAL STRUCTURE

Please Come Home is a three-movement composition. Each movement is a setting of a "Please Come Home" message originally printed in the back pages of the *Freep* between 1967 and 1969. Scans of the three messages are reproduced below (Fig. 1).[5] In the absence of formal titles, I will refer to these messages by their opening words—the names of their addressees: "Tina Louise," "Lenny K.," and "Gail" (29, 21, 28).



Figure 1. Scans of the three "Please Come Home" messages in the order they appear in *Please Come Home*.

For me, the combination of these three messages forms a compelling emotional arc. The dominant emotion in "Tina Louise" is *turbulence*. I set "Tina Louise" from the perspective of Ron, the writer of the classified, and perhaps Tina's partner. Ron appears torn between anger and longing. He reproaches Tina for leaving him during a difficult time ("…you left when I needed you the most") ("Tina Louise"), yet in nearly the same breath implores her to not give up on their relationship ("I still love you with all my heart") ("Tina Louise"). It is as if, feeling both emotions in equal measure, he is unsure which approach will best make his case.[6]

[5] Rather than retype the messages, I have chosen to include scans of the messages as they actually appeared in the *Freep* since their visual identity—their worn, yellowing paper, unique typefaces, contrasting font sizes, awkward line breaks, and uncommon abbreviations—are, at times, as expressive as the words themselves.

[6] "Tina Louise" happens to be the name of the actor who played Ginger Grant on the American sitcom *Gilligan's Island* (1964–1967). While I have found no evidence that the message refers to either the actor or her character, it

The dominant emotion in "Lenny K." is *anxiety.* I set "Lenny K." from Lenny's perspective, imagining him at fifteen or sixteen: no longer a child, but not yet a young adult, and prone to impulsive decisions. Were he a few years older, he would recognize that the boys' school was not a wicked place, but, at that moment, attending the school seems like hell on earth. His parents' message, however well-meaning, offers no relief. If anything, it heightens his anxieties—even sparking paranoia. Is the message a trap? Are his parents in cahoots with Mr. Bossein?

The dominant emotion in "Gail" is *hopelessness*. I set "Gail" from the perspective of her mother, father, and Brett (perhaps her brother). The family seems despondent. I imagine that this message is the last of many. Their previous pleas, enticements, even threats have failed, and with each unanswered message they have had to accept smaller and smaller settlements of hope. "Come home," has become "please call," which has become "just let us know you're okay," which has become a simple appeal to Gail's basic humanity: "do you still care?" Her mother, father, and brother are utterly deflated. They write because there is nothing else to do, but they no longer expect a response.

Taken together, the three messages trace an emotional trajectory from turbulence to anxiety to hopelessness, suggesting a corresponding musical progression from a moderato, *sturm und drang* first movement, to a biting scherzo, to a grave, meditative adagio.

In each movement, I present the messages by playing back recordings I made of myself reading—indeed, to some extent acting out—the three "Please Come Home" personals. With a few exceptions, these recordings also form the source material for all the sounds that accompany

---

may nonetheless allude to her (perhaps as an in-joke of the era that has since been lost to time). In any case, I have chosen to take the "Tina Louise" message at face value. In my setting, Tina Louise is not the actor, but simply Ron's estranged partner.

and vivify the messages. Recording the messages myself offered two important advantages. First, all three recordings, and the sounds derived from them, share the same sonic DNA: the timbre of my voice. No matter how extensively I abstract the recordings, the resulting sounds remain inherently connected—a connection that may only be felt subconsciously by the listener yet is nonetheless present. Secondly, by using my own recordings, I am able to write music that operates on two distinct levels. On the surface, *Please Come Home* is a setting of the messages—a portrait of their writers and addressees. However, because I use my voice as a literal stand-in for theirs, the work also becomes an expression of my own relationship to the messages—my own experience of turbulence, anxiety, and hopelessness, and my own journeys away from and back to home.

In each movement of *Please Come Home*, sounds fall into two broad categories: 1) "music"—sounds derived from manipulations of the recordings that are no longer intelligible as speech—and 2) "text"—sounds that are intended to be intelligible, even when they are abstracted to varying degrees. Sonically, the difference between these two categories varies in its clarity. All the sounds (both "music" and "text") are *musical*, and because they are derived from the same recordings of the messages, they are all inherently *textual*. It will nonetheless be useful to distinguish between these two categories in later chapters, as they serve distinct narrative purposes. When referring to these categories, they will always be placed in quotation marks.

The structural relationship between these categories remains consistent across movements. In each movement, "music" unfolds continuously, providing a sonic backdrop for the "text." At various points in each movement a new section of "text" interrupts the "music." The "music," in turn, responds to the "text."

CHAPTER III

DATA-DRIVEN INSTRUMENT STRUCTURE

Overview

Please Come Home is a data-driven composition, a musical work composed and performed with a data-driven instrument. Data-driven instruments are digital musical instruments which fundamentally differ from their acoustic counterparts. In order to play an acoustic instrument, a performer exerts force into the instrument (pressing a piano key, bowing a violin string, blowing into a trumpet mouthpiece) which causes the instrument to resonate. In order to play a data-driven instrument, however, a performer inputs data into a sound-producing algorithm which generates sonic outcomes based on the data received. As Jeffrey Stolet writes in his book *Do: Notes about Action in the Creation of Musical Performance with Data-driven Instruments*, data replaces physical effort as "the driving force behind sonic actualization" (23).

Unlike most acoustic instruments, data-driven instruments are not singular devices. Instead, they comprise "three interconnected conceptual elements" or stages (Stolet, *Do* 23):

1. ***Data acquisition,*** in which a performer operates an interface device that generates data based on the performer's actions.
2. ***Data mapping,*** in which data generated by the interface device is routed through one or more software layers and translated into new data. As Stolet describes, each input data point is either directly mapped to an output data point or analyzed and transformed into a new output data point (*Do* 23).
3. ***Sound synthesis,*** in which the transformed data is sent as control data to a sound-producing algorithm, where it is used to change musical parameters in real time.

For each element of a data-driven instrument, any number of devices, software, mapping strategies, and DSPs may be used in place of each other (though with different musical results). The data-driven instrument I created for *Please Come Home* includes the following components:

1. ***Leap Motion Controller*** (interface)
2. ***Max/MSP and Kyma Software*** (initial and secondary mapping layers, respectively)
3. ***Kyma Pacamara Hardware*** (DSP)

Figure 2 shows how data flows between these components.

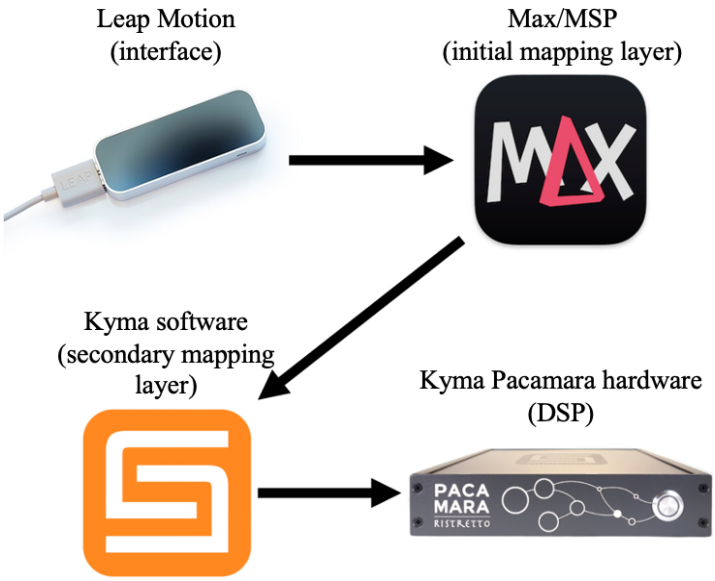


Figure 2. Data-routing between the four components of my data-driven instrument.

Leap Motion Controller

The Leap Motion Controller is a sensor interface developed by Ultraleap (formerly Leap Motion, Inc.) which uses two infrared cameras and three infrared LEDs to track hand and finger

movements in 3D space (hand and finger positions, rotation quaternions, and velocities along the x-, y-, and z-axes, in addition to a few peripheral characteristics) (Fig. 3). A performer activates the Leap Motion by moving their hands and fingers within the "interaction area" (Fig. 4).

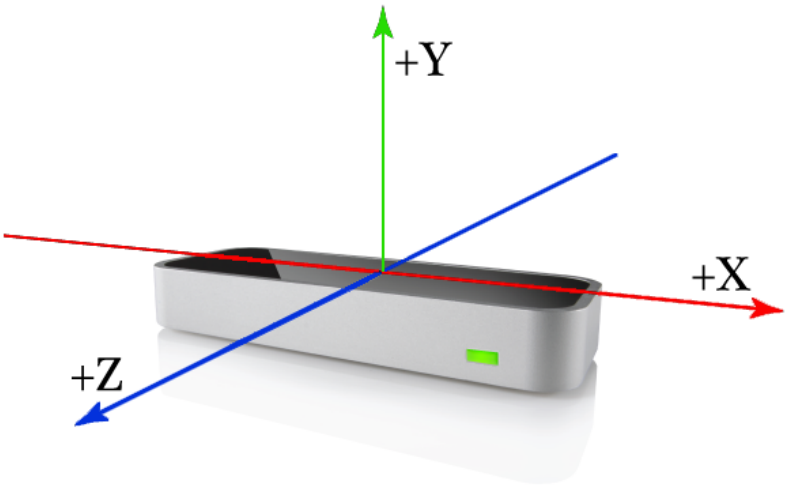


Figure 3. Leap Motion Controller with the x-, y-, and z-axes labeled. ("Leap Concepts")

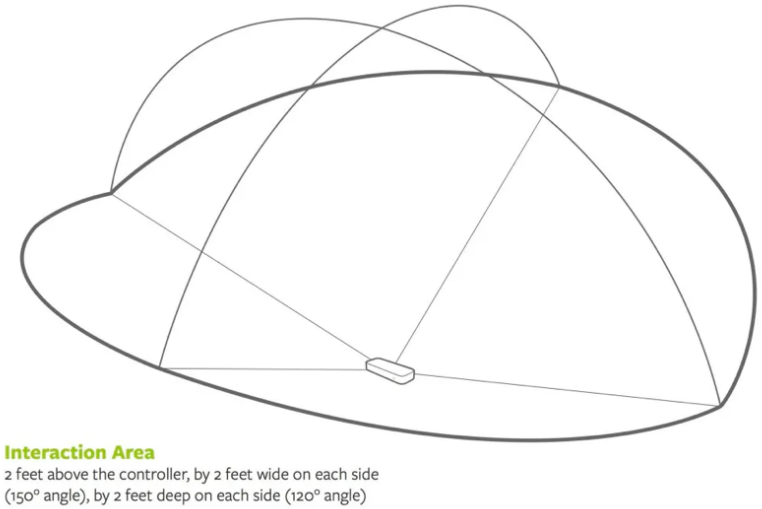


Figure 4. Leap Motion "interaction area" (LeapMotion)

In response to a performer's movements, the Leap Motion outputs a plethora of data streams. In *Please Come Home*, I am using the following subset of possibilities (abbreviations in parentheses will be used from here on):

Left Hand in Frame (LH.InFrame)
Left Hand Position X (LH.PosX)
Left Hand Position Y (LH.PosY)
Left Hand Position Z (LH.PosZ)
Left Hand Quaternion X (LH.QuatX)
Left Hand Quaternion Y (LH.QuatY)
Left Hand Quaternion Z (LH.QuatZ)
Left Hand Velocity X (LH.VelX)
Left Hand Velocity Y (LH.VelY)
Left Hand Velocity Z (LH.VelZ)
Left Hand Grab (LH.Grab)

Right Hand in Frame (RH.InFrame)
Right Hand Position X (RH.PosX)
Right Hand Position Y (RH.PosY)
Right Hand Position Z (RH.PosZ)
Right Hand Quaternion X (RH.QuatX)
Right Hand Quaternion Y (RH.QuatY)
Right Hand Quaternion Z (RH.QuatZ)
Right Hand Velocity X (RH.VelX)
Right Hand Velocity Y (RH.VelY)
Right Hand Velocity Z (RH.VelZ)
Right Hand Grab (RH.Grab)

Max/MSP (Mapping Layer 1)

In Max/MSP, the Leap Motion data is received by the "ultraleap" object (Fig. 5).[7] I then parse and transform the data using a range of mapping strategies. At this stage, the mapping is not compositional; rather, it serves to clean up the data. Incoming data streams arrive in Max with varying ranges, so they are normalized to minimum and maximum values that I can reliably perform, eliminating occasional outliers. The data is then scaled to MIDI-compatible ranges (0-127 for low-resolution MIDI and 0-16,384 for high-resolution MIDI). The scaled data is then smoothed to remove any inherent jitter. Finally, the processed data is output from Max on MIDI channel 1 as continuous controllers #1-6, 8-16, and 18-20 (high-resolution), and #70, 71, 73, and 75 (low-resolution) (Fig. 6).[8] Additionally, I combine six data streams (LH.PosX, LH.PosY,

[7] The "ultraleap" object is part of Jean-Michaël Celerier & Mathieu Chamagne's Ultraleap Max package (Celerier).
[8] Continuous controllers #7, 17, 72, and 74 were assigned to data streams that I did not end up using in my final composition.

LH.PosZ, RH.PosX, RH.PosY, RH.PosZ) in order to calculate a new data stream, Hand Distance (HandDis), which is output on MIDI channel 1 as continuous controller #21 (high-resolution) (Fig. 7).

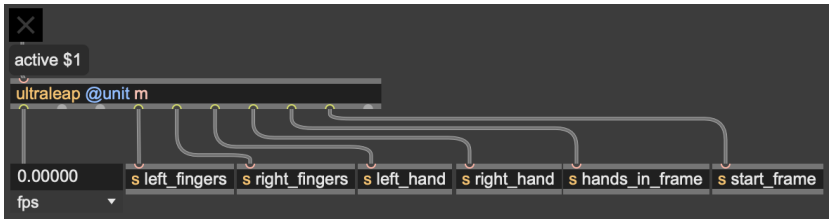


Figure 5. The "ultraleap" object receives data from the Leap Motion. The data is grouped into categories (left hand, right hand, etc.). The data associated with each category is sent to a different subpatch for further mapping.

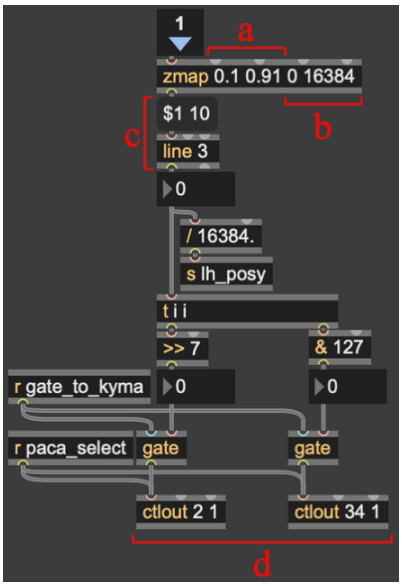


Figure 6. LH.PosY subpatch showing various mapping strategies: a) normalization, b) scaling, c) smoothing, and d) MIDI output.

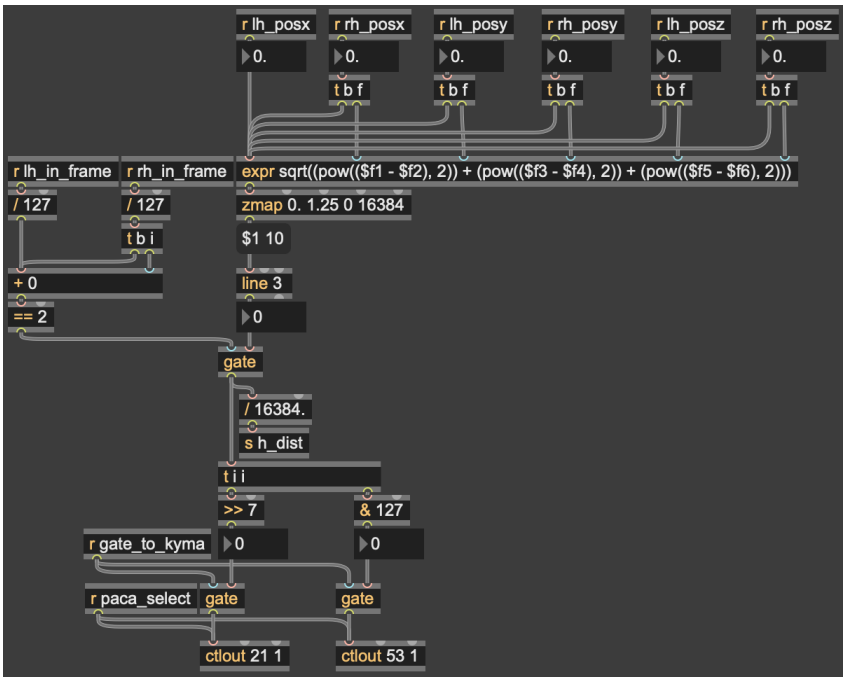


Figure 7. HandDis subpatch. The six data streams used to calculate HandDis are input to the "receive" objects (e.g. "r lh_posx") at the top of the subpatch.

Kyma (Mapping Layer 2 and DSP)

The MIDI data is then received by Kyma via corresponding Event Values—a specialized syntax used in the parameter fields of Kyma sound objects to receive and output data from external sources or virtual controllers within the Kyma environment. Event Values follow a consistent format: an exclamation point followed by a name (e.g., !Frequency, !Amplitude, !TimeIndex). For example, LH.PosX is transmitted from Max as continuous controller #1; Kyma receives this data, rescales it from a range of 0-16,384 to 0-1, and outputs it as the Event Value, !lc01.

Within Kyma, I further transform the data using additional mapping strategies. At this stage, the mapping is primarily compositional, meaning its purpose is to generate sonic change. Mapping in Kyma is done primarily through Capytalk, an embedded, event-driven, real-time

control language (Stolet, *Kyma* 40). For instance, if I want to trigger sample playback whenever my left hand crosses to the right of the midpoint of the x-axis (LH.PosX), I can enter the following Capytalk expression **(!lc01 gt: 0.5)** into the "Gate" parameter field of a Sample sound object (Fig. 8). When my hand moves to the right of the half-way point, the value of !lc01 exceeds 0.5. When this threshold is breached, Kyma triggers playback of the designated sample.

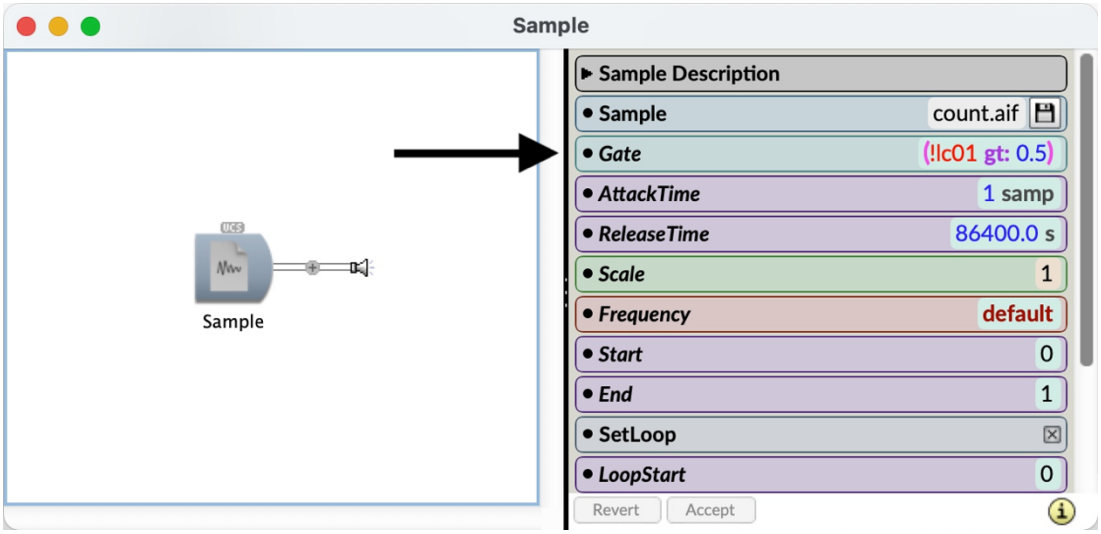


Figure 8. The Sample object editor window in Kyma. An arrow indicates the "Gate" parameter field.

CHAPTER IV

TEXT-SETTING STRATEGIES

A range of text-setting strategies is employed throughout *Please Come Home*. Although the scope of this dissertation does not permit a comprehensive discussion of all of them, this section offers a detailed examination of several techniques used in the first movement, "Tina Louise." While these approaches differ from those used in the second and third movements, they are intended to provide insight into my broader compositional process.

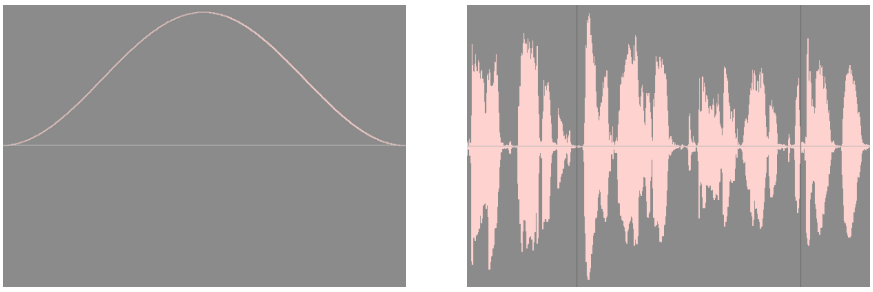
This section is divided into two parts: 1) "music" sounds and 2) "text" sounds (see Chapter II). For each category, I briefly describe how the sounds were designed, how they are performed, and which aspects of "Tina Louise" they are intended to represent.

Tina Louise "Music"

In "Tina Louise," Ron writes from a place of simultaneous anger and longing. In setting these emotions, I chose to represent the former through the "music" and the latter through the "text." To musicalize Ron's indignation, I created a sound in which short segments of the "Tina Louise" recording undergo analysis and granular resynthesis using a CloudBank. The grain envelope—the amplitude shape of each individual grain in the cloud, typically a simple function such as a Gaussian or Hanning window—is, in this case, derived from the entire "Tina Louise" recording, compressed into a single cycle (4,096 samples in Kyma) (Fig. 9).

The output of the CloudBank then undergoes a second stage of analysis and resynthesis using an OscillatorBank, enabling further frequency manipulation. The output of this second stage of analysis and resynthesis is subsequently spatialized with MultichannelPan and processed

with EUVerb Reverberation. Figure 10 shows the complete signal chain.[9] Because the grain envelope is highly irregular, the resulting sound is unstable and unpredictable—glitch-like in character—producing textures that variously crackle, bubble, scrape, and saw. In my conception, these sonic qualities reflect the nature of Ron's ire.



Hanning Window "Tina Louise" Window

Figure 9. Comparison of a common Hanning window (left) and my custom "Tina Louise" window (right).

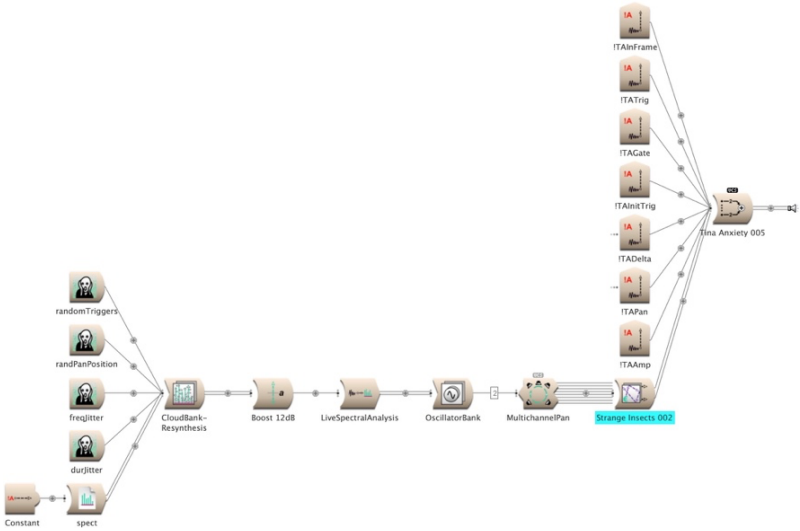


Figure 10. Entire "music" sound structure.

[9] In Kyma, sound objects can be renamed. In Figure 10, for instance, "EUVerb Reverberation" has been renamed "Strange Insects 002." Renaming a sound object does not change its function. Additionally, I have sometimes given sound objects names which reflect earlier conceptions of their emotional resonance. For instance, this whole sound structure is named "Tina Anxiety 005," even though I ultimately used it to represent Ron's anger. For logistical reasons, these earlier names were not changed.

I perform this sound with my right hand. In Kyma, x-, y-, and z-axis velocity data (RH.VelX, RH.VelY, RH.VelZ) are summed to produce the combined or total velocity of my hand. When this value exceeds 0.1, a trigger (!TATrig) is generated, initiating a new segment of the "Tina Louise" recording, which is subsequently routed through the processes described above (Fig. 11).[10]

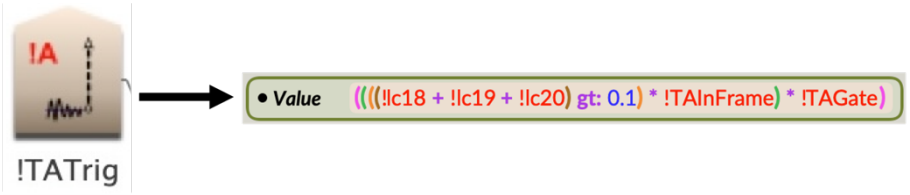


Figure 11. The SoundToGlobalController which outputs !TATrig (left) and the Capytalk expression which specifies the value of !TATrig (right).

I also calculate the delta (rate of change) of this average velocity, which controls the amplitude of the sound as well as several CloudBank parameters, including maximum grain duration, cycles per grain, and grain duration jitter (Fig. 12). Additionally, I use right hand y-position. (RH.PosY) data to scale the frequencies within the second stage of analysis and resynthesis (Fig. 13).

Using x- and z-position data (RH.PosX, RH.PosZ), I determine the angle of my hand relative to the Leap Motion—effectively its position along an imaginary circle centered on the

[10] The Capytalk expression shown in Figure 11 includes two additional event values: !TAInFrame and !TAGate. !TAInFrame receives and outputs data indicating whether my right hand is inside or outside the Leap Motion's "interaction area" (RH.InFrame). When my right hand is inside the interaction area, !TAInFrame outputs a value of 1; when it is outside, it outputs 0. !TAGate receives and outputs data specifying whether the "Tina Louise" "text" sound, Tina Voice 010 (see Fig. 15), is playing. When Tina Voice 010 is active, !TAGate outputs 0; when it is not, it outputs 1. Because both values multiply the combined velocity by either 1 or 0, !TAInFrame and !TAGate function as independent gates. My right hand must be in the "interaction area" and Tina Voice 010 must be inactive for the Capytalk expression to produce a trigger (!TATrig).

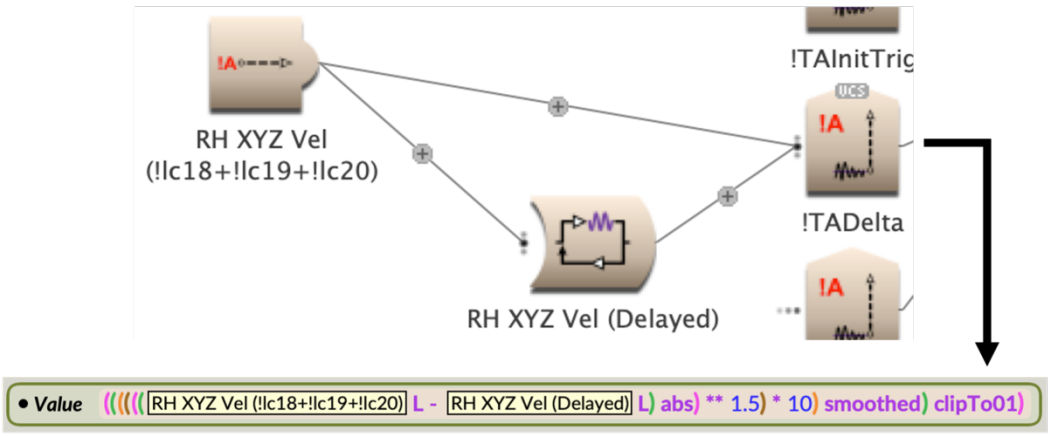


Figure 12. The sound structure used to calculate the delta of the combined velocity.



Figure 13. Right hand y-position (RH.PosY) is mapped to a frequency multiplier in the LiveSpectralAnalysis

device and parallel to the ground. This angle controls spatialization, mapping the sound onto a corresponding position within the four-speaker array. As a result, the sound appears to move in accordance with my hand's position along this circle. For example, when my hand is at an angle of 225° (to the left of the Leap Motion and toward my body), the sound is panned to the front right speaker; when my hand is at an angle of 90° (to the left of, and aligned with, the Leap Motion), the sound is positioned between the front left and surround left speakers (Fig. 14).

Mirroring the glitch-like character of the sound, my performative actions are deliberately erratic. I move in abrupt, discontinuous bursts, tracing jagged paths through the performance space before abruptly freezing.

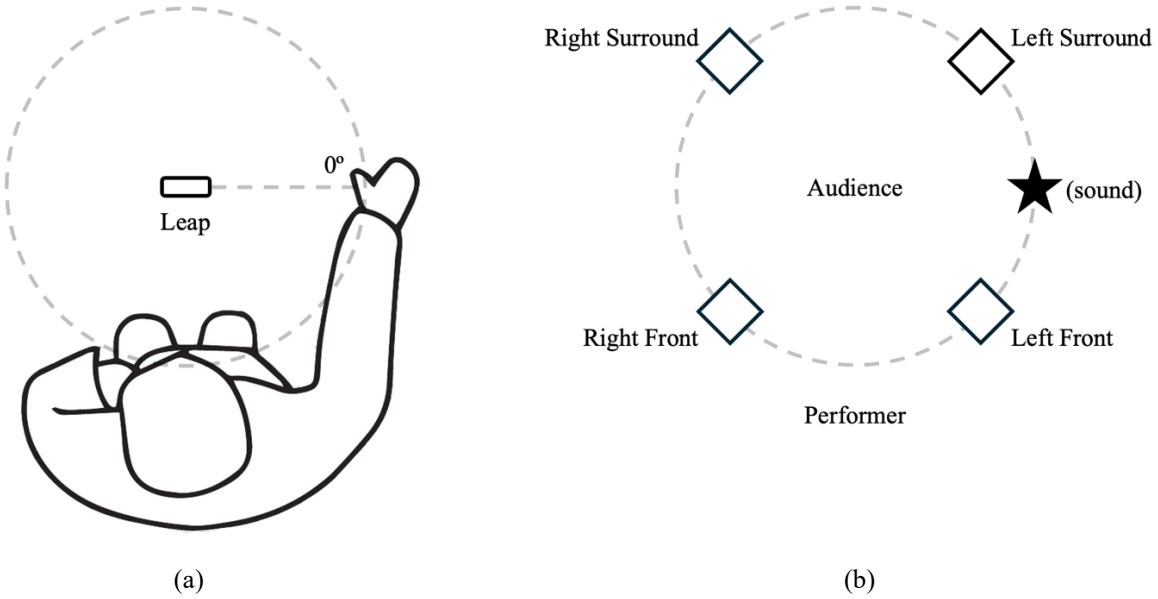


Figure 14. (a) An aerial view of the performer placing their right hand at the 0º point on the imaginary panning circle. (b) An aerial view of the venue showing the positions of the performer, loudspeakers, and audience. The performer's hand position in (a) maps to the panning position indicated by the star in (b).

Tina Louise "Text"

At five points throughout the first movement, I trigger the "text" sound—the playback of a new line from the recording of the "Tina Louise" text, interrupting the "music" described above. The "Tina Louise" text is broken into the following lines:

1. Tina Louise
2. My mother is dying and you left when I needed you the most.
3. I still love you with all my heart.
4. Please come home.
5. Ron.

The “text” sound, designated as Tina Voice 010, comprises three distinct components, labeled in Figure 15 as 1) Tina Voice (OscillatorBank), 2) Tina Voice (CloudBank), and 3) Tina Swell 003. All three are triggered simultaneously by the same set of performative actions: extending my left hand toward the audience and rotating my palm to face them (these actions and their gestural significance are discussed at length in Chapter VI).

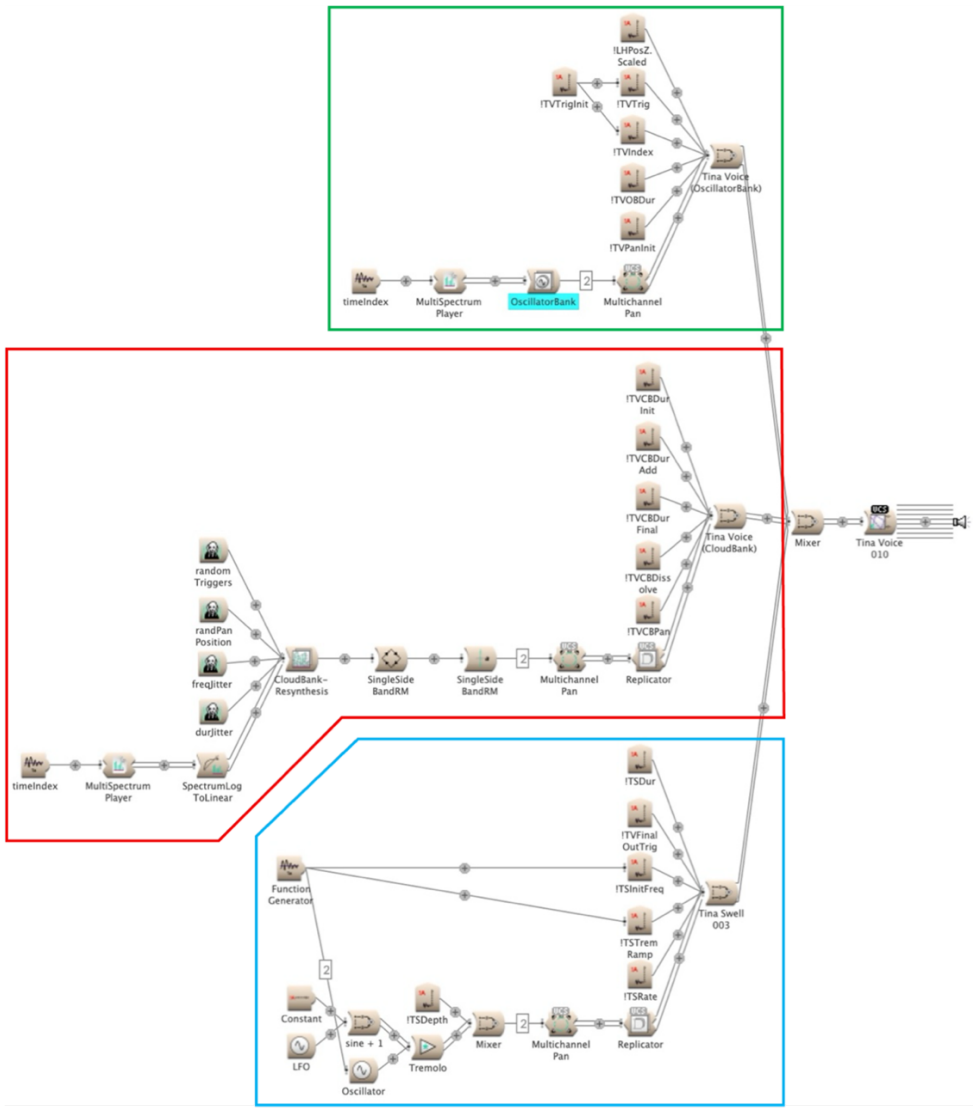


Figure 15. Tina Voice 010 sound structure with the three parts labeled: Tina Voice (OscillatorBank) in green, Tina Voice (CloudBank) in red, and Tina Swell 003 in blue.

Tina Voice (OscillatorBank) represents Ron's outward expression of his longing for Tina. Recordings of each line of "Tina Louise" are analyzed and resynthesized using an OscillatorBank; aside from minor adjustments to duration and frequency, these resyntheses closely mirror the original recordings. As such, Tina Voice (OscillatorBank) functions as Ron's real voice—unadorned and direct. He is openly expressive about his desire to be with Tina, yet, out of pride, he appears to strive for composure.

Tina Voice (CloudBank) represents Ron's hidden insecurities surrounding his longing for Tina. In this sound, which seems to emerge out of Tina Voice (OscillatorBank), recordings of each line of "Tina Louise" are again analyzed, but this time undergo granular resynthesis using a CloudBank. Here, the recordings remain intelligible but are significantly transformed. Reconstituted as the accumulation of hundreds of minute grains, the voice takes on a fluid, almost aqueous texture. As each line unfolds, its duration stretches while the grains shorten and disperse. By the fifth line of text ("Ron."), the recording has thinned to a few isolated bubbles of sound, rising to the proverbial surface, as if someone—Ron—sinks beneath it. Where Ron's outer voice is, if not strong, then at least stable, Tina Voice (CloudBank) reveals an inner state that is anything but. His outward composure conceals a tremulous insecurity about his relationship with Tina and the possibility that she may never return.

Finally, Tina Swell 003 represents Ron's even deeper, more fundamental pain buried beneath his insecurities. I imagine that Ron *feels* this pain but cannot explain it. It is not an anxiety so much as a pit in his chest. To represent Ron's fundamental pain, I decided to use reduced sawtooth waves, each with only four harmonics.[11] As Tina Voice (OscillatorBank) and

[11] Even though Tina Swell 003 is not derived from the "Tina Louise" recording, it is part of the larger musical phrase which includes Tina Voice (OscillatorBank) and Tina Voice (CloudBank). Therefore, I consider Tina Swell 003 as part of the "text" sound.

Tina Voice (CloudBank) die away in succession, three slightly detuned sawtooth oscillators playing low frequencies between 31 nn and 38 nn (G1 and D2) slowly swell forward. They crest at the approximate moment Tina Voice (CloudBank) ends. At the point of this crest, amplitude modulation is engaged, and the three oscillators tremolo, fading back into silence.

CHAPTER V

INDETERMINACY AS METAPHOR FOR ANXIETY

In《笃行》(*Do*), Stolet defines indeterminacy as a "compositional approach where certain elements of a piece are left unspecified and determined by chance, algorithm, or the performer's discretion so that the resulting outcome is unpredictable" (Stolet). In computer music, indeterminacy is often created using algorithms which produce pseudo-random or probabilistically random values which can be used to control various sonic parameters.[12] In Kyma, these algorithms are often written using Capytalk (see Chapter III). Below is an example of a Capytalk expression entered into the "Frequency" parameter field of a Sample sound object. The expression will generate a new, random value between 100 and 1,000 every two seconds. Because the expression is entered in the "Frequency" parameter field, Kyma will interpret these values as frequency values in Hertz (Fig. 16).



Figure 16. Example of a Capytalk expression which produces pseudo-random values.

I use indeterminacy—implemented through Capytalk—in nearly every aspect of my compositions, primarily to make the music feel organic and interactive. For instance, I might apply a Capytalk expression to introduce subtle, imperfections into a repeating rhythmic pattern, mirroring the variability of human performance. Figure 17 compares two expressions, both entered into the "Gate" parameter fields of Sample sound objects. When an expression produces

[12] In computers, random number generators are not truly random. Instead, they use algorithms to approximate true randomness.

a trigger in this field (a value greater than 0), the Sample object restarts playback. The expression on the left generates a trigger precisely every one second, resulting in a rigid, square rhythm. By contrast, the expression on the right produces a trigger every one second ± 10 milliseconds, yielding a more flexible, organic rhythm.



Figure 17. Comparison of two trigger-generating Capytalk expressions, one metronomic (left), and one "organic" (right).

Alternatively, I might design a Capytalk expression that, when triggered, randomly selects one of four sample loops within a Multisample: a harp glissando, a dog barking, pottery breaking, or fire crackling (Fig. 18). This indeterminacy invites real-time interaction. Each time I trigger the expression, a new sample is chosen at random, and that outcome shapes my decision about when to trigger the expression again. For instance, if the abrasive pottery sound is selected, I may quickly trigger the expression to select a new sample; if the lush harp glissando appears, I may linger in its more pleasant sonority.

In *Please Come Home*, indeterminacy takes on an additional, metaphoric role. Perhaps the most salient emotion expressed in the *Please Come Home* messages is anxiety. In just a few words, these messages convey the distress of people who have not seen their loved ones for weeks, months, or even longer. At the same time, they invite us to imagine the anxieties of the addressees—both those they may have experienced at home (the reasons for their escapes) and those they may have faced as runaways. Despite a sense of freedom their departures offered, runaways of the period often found themselves in vulnerable positions—without shelter, money, or healthcare, and frequently reliant on strangers whose motivations (as discussed in Chapter I)

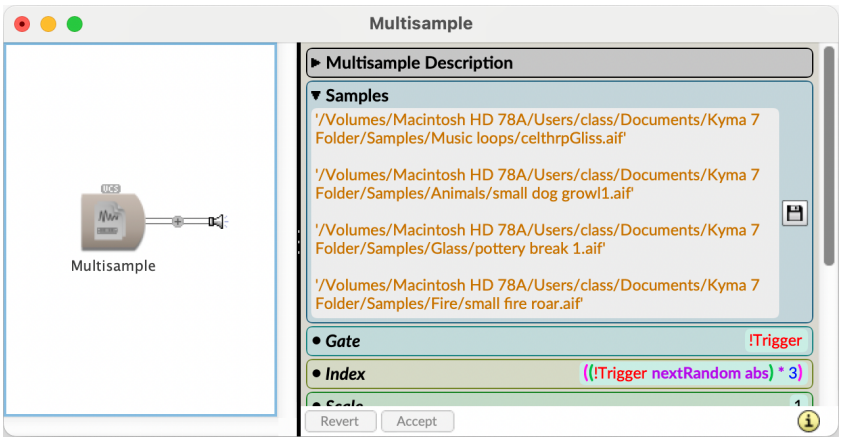


Figure 18. A Kyma Multisample object. !Triggers initiates playback and prompts the Capytalk expression in the "Index" parameter field to select which sample will be played.

were not always well-meaning. While the fates of Tina Louise, Lenny K., and Gail are unknown, I imagine that they experienced some of these hardships. Among other techniques, I use indeterminacy to musically represent these anxieties. Below are two examples, one from movement two ("Lenny K.") and one from movement three ("Gail"), that illustrate how I employ indeterminacy to express Lenny, and Gail's family's, uncertainty respectively. Placing these examples side by side also demonstrates how I design bespoke indeterminate algorithms to represent the distinct qualities of the anxiety experienced by each.

Lenny K.

I imagine that Lenny's anxieties cause his mind to race and his actions to become erratic. They cause him to panic. To musicalize his panic, I composed a flighty, *moto perpetuo* sound, in which the recording of the "Lenny K." text is chopped into short snippets (approximately 35 to 40 ms long) that are rapidly played back at a variable tempo. To control the playback tempo

(!FLGlobalTempo), I use the following Capytalk expression which outputs a bpm value of CenterValue ± a constantly changing random value between -5 and 5:

(!CenterValue + (((((1 ramp0: 5 s) * 5) s random) * 5) smooth: 5 s)) bpm

The CenterValue begins at 700 bpm (0.0857 seconds per beat), accelerates to 800 bpm (0.075 seconds) at the movement's climax, and then slows to 200 bpm (0.3 seconds). The added random value (±5) produces a barely perceptible fluctuation in tempo but contributes to the overall organic quality of the rhythm.

While this Capytalk expression determines the playback rate of the "Lenny K." snippets, I control the frequency, as well as other parameters, of each snippet through performance. Specifically, I move my right hand up and down along the y-axis, producing changes in the RH.PosY value. I then convert this changing value into a series of triggers using the following Capytalk expression:

((!lc12 tripWires: 0.1) alignWith: (!FLGlobalTempo bpm s tick))

This expression creates an array of ten, equally spaced, virtual trip wires or thresholds with values [0, 0.1, 0.2…, 1]. When the RH.PosY value passes one of these thresholds, a trigger (!FLGlobalTrig) is generated. Each trigger prompts the following Capytalk expression to probabilistically select a new random frequency:

(((((!FLGlobalTrig nextRandom abs) warpBy: (!FLGlobalTrig sampleAndHold: ((1 - !lc12) – 0.5))) * 9950) + 50) + (((!FLGlobalTempo bpm s tick) nextRandom) * 2)) hz

This expression probabilistically selects a frequency value in hertz between 50 and 10,000, offset by a small random amount (±2) generated on each beat of the tempo specified by the first Capytalk expression above. The likelihood of particular frequencies being chosen is shaped by the position of my hand along the y-axis (RH.PosY). When my hand crosses a threshold specified by the second Capytalk expression above, its RH.PosY value is recorded. When this value is lower (when my hand is closer to the Leap Motion), lower frequencies are more likely to be produced; when it is higher (when my hand is further from the Leap Motion), higher frequencies become more likely.

Using indeterminate Capytalk expressions, I create a sound characterized by 1) an extremely fast tempo, offset by 2) small pseudo-random deviations, along with 3) probabilistically selected frequencies across a wide range, also offset by 4) subtle pseudo-random variation. Together, these four sonic features help to musically depict Lenny's frenetic anxiety.

Gail

In contrast to Lenny's anxiety, I imagine Gail's family's anxiety as having dulled over time. After so long (perhaps years) of holding out hope, their desperation has lost its urgency; faith has given way to a kind of numb mourning. To musicalize this state, I composed a slow, ten-part, chorale-like sound anchored around a middle C pedal tone. Unlike the other sounds in this movement, the source of this chorale is not the recording of the "Gail" text. Instead, it is

generated by passing white noise through a set of band-pass filters (Fig. 19). I chose white noise for its numb, blank quality, which, for me, reflects the emotional state of Gail's family.

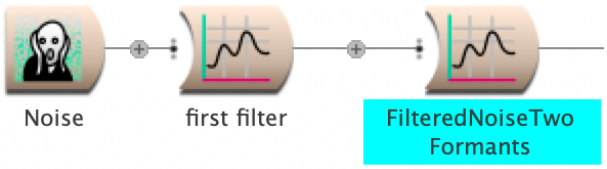


Figure 19. White noise sent through a series of band-pass filters called FilteredNoiseTwoFormants in Kyma.

The frequency of the middle C pedal tone is generated by the following Capytalk expression, which outputs a MIDI pitch of 60 ± a constantly changing random value between -1 and 1:

(((60 + ((1 ramp0: 0.001 s) * 10) s random)) smooth: 10 s) nn

The random offset differs for each of the ten voices in the chorale, producing ten slightly varied middle C pedal tones that, when heard together, merge into a single wavering, unstable note. The amplitude of the chords that emerge from this pedal tone are controlled by the distance between my hands (HandDis). Chord changes are triggered at the initial moment I move my hands away from each other (the initial moment the current HandDis value is greater than the previous HandDis value). In order to trigger another chord, I must move my hands closer together, and then farther apart again. Within Kyma, I've named this trigger !GCChordTrig.

The frequency of each of the 10 voices in the chorale is generated by the following Capytalk expression:

((((!GCChordTrig nextRandom abs) * 21.99) floor) of: #(-24 -22 -20 -19 -17 -15 -13 -12 -10 -8 -7 -5 -3 -1 0 2 4 5 7 9 11 12))

When a new chord is triggered (!GCChordTrig), this expression outputs a randomly selected value from the provided array [-24, -22, -20…,12] for each voice. These randomly selected values are then added to each voice's corresponding pedal tone value to produce an approximate pitch in the C-Major scale between C2 and C5. For instance, imagine that I trigger a new chord. At the moment of the trigger, the Capytalk expression controlling the frequency of the first voice's pedal tone outputs the value 60.35. At the same moment, the Capytalk expression controlling the frequency of the first voice in the chord outputs the value -17. Then 60.35 is added to -17, which equals 43.35 or 35 cents above G2.

To musicalize Lenny's frantic anxiety, I developed an indeterminate algorithm that produces essentially infinite possible frequency values within the range of 9,950 (± small random offsets). In contrast, to musicalize Gail's family's muted anxiety, I developed an indeterminate algorithm that yields only 22 possible frequency values (± small random offsets). Gail's family's anxiety is still conveyed through indeterminacy—they remain anxious, after all—but it is a far narrower indeterminacy. Just as they seem resigned to the likelihood that they may never hear from Gail again, so too is their algorithm resigned to a limited set of possible outcomes.

CHAPTER VI

PERFORMATIVE ACTIONS AS SYMBOLIC GESTURES

In a musical performance, the audience's reception and interpretation of the music is significantly impacted by the visual domain elements which accompany it. In *Do*, Stolet describes these elements as "cinematics" (124). Cinematics range from the overt to the subtle, encompassing everything from the architecture of the concert venue to the performers' body language. Depending on the composer and the piece, cinematics may or may not factor into the composition process; for me, more often than not, they don't. While composing *Please Come Home*, however—perhaps because of the work's literary (i.e. extra-musical) origin—cinematics, and gesture in particular, became a central compositional concern.

Many of the performative actions in *Please Come Home* can be interpreted as gestures. At first glance, this may seem like an unnecessary—even fallacious—distinction. However, it is important to clarify that performative actions are *not* gestures. A performative action is a "movement that actuates the sound" of an instrument (Stolet, *Do* 100)—for example, depressing a piano key—and carries no inherent meaning beyond its function of producing sound. A gesture, by contrast, is a culturally agreed-upon signal or familiar form of body language—such as a peace sign or a head nod—used to communicate a message, either alongside or in place of speech. Within specific cultures (and sometimes across cultures), such gestures carry widely understood meanings or symbolic associations: a peace sign signifies peace, while a head nod typically indicates agreement.

Similarly, it is important to clarify that data-driven instruments are *not* gestural controllers.[13] While the terms are often used synonymously (and while the latter is an approachable way of describing data-driven instruments to nonexperts), this linguistic looseness obscures an important fact: data-driven instruments typically do not recognize gestures. Take, as an example, the Leap Motion. I might trigger a sound by waving my left hand in front of the Leap Motion along the x-axis. An audience may interpret this performative action as a handwave—a gesture commonly used to greet someone—and may even hear the resulting sound through that lens, perhaps perceiving it as welcoming. The Leap Motion, however, has no conception of a handwave or what it signifies. Instead, it simply tracks my hand's oscillating movement along the x-axis and outputs data reflecting that change; within the mapping layer of my data-driven instrument, I map that data to a trigger for a specific sound.

While this example illustrates the distinction between a data-driven instrument and a gestural controller, it also suggests how a performative action used to actuate a data-driven instrument may operate on a secondary, gestural level, contributing to the cinematics of the performance. When composing *Please Come Home*, I leaned into this duality, crafting performative actions that could be read as gestures. These gestures, in turn, help vivify the characters I inhabit in each movement, and guide the audience's interpretation of the text and music associated with each character. The gestures used in *Please Come Home* primarily fall into two categories: symbolic (emblematic) manual gestures—culturally specific gestures which are often used in place of words, such as a handwave or thumbs up—and lexical (iconic) manual gestures—gestures which mirror and intensify co-occurring speech (Krauss 262-63).

[13] Some computer applications used in data-driven instruments, such as Google MediaPipe and YOLO, are an exception. These applications employ computer vision to recognize gestures (e.g., a peace sign). However, it is worth noting that these applications are trained to recognize the visual identity of a gesture, not its cultural symbolism.

As an example, let's look at the physical motions I employ when performing the "text" sounds from the first movement, "Tina Louise" (discussed briefly in Chapter IV). I will 1) provide a series of frame captures from the *Please Come Home* video illustrating the movement, 2) explain how the movement functions as a performative action (how it produces data which is then used to actuate sound), and 3) how it may be read, or interpreted, as a gesture.

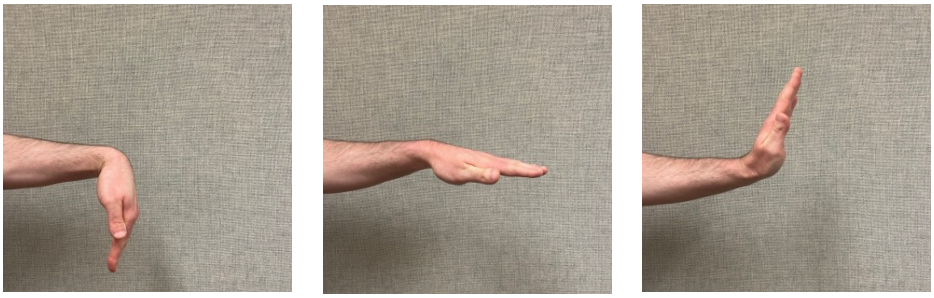
At five points throughout the first movement, I trigger the playback of a new line from the recording of the "Tina Louise" text. In order to initiate playback, I perform a sequence of actions (shown in Fig. 20) which produce data that satisfies two, precomposed conditions: 1) LH.PosZ is greater than 0.95 (for the first trigger, as discussed later), and 2) LH.QuatX is greater than 0.5.



Figure 20. Frame captures depicting performative action.

LH.PosZ is the data stream which measures the position of my left hand along the z-axis, which extends outwards from my body towards the audience. When my left hand is at my body, LH.PosZ outputs a value of 0; when my left arm is fully extended in front of, and away from, my body, LH.PosZ outputs a value of 1. To output a LH.PosZ value that is greater than 0.95, I move my left hand outwards away my body until it is approximately an arm's length in front of me.

LH.QuatX is the data stream which measures the rotation of my left hand around the x-axis, which extends across my body from left to right. When my left hand is rotated downwards, LH.QuatX outputs a value of 0; when my left hand is parallel to my arm, LH.QuatX outputs a value of 0.5; when my left hand is rotated upwards, LH.QuatX outputs a value of 1 (Fig. 21). To output a LH.QuatX value greater than 0.5, I rotate my hand upwards so that it is facing the audience, forming an approximately 45-degree angle with the floor. This action is performed simultaneously with the previously described action.



LH.QuatX = 0 LH.QuatX = 0.5 LH.QuatX = 1

Figure 21. Hand rotations along the x-axis which produce three different values.

Once both conditions are met, and playback is triggered, I bring my hand back towards my body and rotate my hand towards the floor until LH.PosZ equals 0 and LH.QuatX is less than or equal to 0.5. The same sequence of actions is repeated to trigger each section of text; however,

the threshold that LH.PosZ must exceed decreases with each trigger, lowering from 0.95 to 0.8, 0.6, 0.4, and 0.2, respectively. With each trigger, then, I extend my left hand a shorter distance along the z-axis (Fig. 22).



Figure 22. Frame captures showing how far I extend my hand for each trigger.

While this sequence of performative actions is primarily logistical—motions that generate values to satisfy conditions—it can also be read as a set of meaningful gestures. Extending my hand outward toward the audience and rotating it so the palm faces forward evokes a stop or halt signal (perhaps most iconically associated with police directing traffic). Drawing my left hand inward and rotating it downward so the palm faces the floor suggests a gesture of yearning or recoil—one that might be made in an attempt to grasp something slipping away, or in response to the sensation of slipping away oneself.

These gestures underscore Ron's emotional conflict in "Tina Louise." The stop gesture conveys his chastisement of Tina, while the yearning gesture expresses his longing for her. With each trigger, my reach becomes shorter and less assertive, suggesting that Ron's hopes for reunion are fading. She is slipping away from him, and he—perhaps driven by anger and pain—is, in turn, allowing himself to slip away from her.

CHAPTER VII

SUMMARY

Please Come Home is a data-driven composition for Ultraleap's Leap Motion Controller, Cycling '74's Max/MSP, Symbolic Sound's Kyma, and quadraphonic speaker configuration. The work sets three "Please Come Home" messages from the back pages of the *Los Angeles Free Press*, in which frightened and desperate relatives plead for their runaway loved ones to return home. This dissertation includes audio/video documentation of *Please Come Home*, software materials necessary for a performance of the piece, and this text document, which provides general information about the composition and my process, as well as a deeper investigation of several key musical areas.

Through the combination of these components, I explore these messages—these objects of ephemera—and the powerful poetry of longing they contain. By setting these messages to music, I aim to render a vivid portrait of these relatives and their loved ones, delving into their inner lives to uncover their hopes, anxieties and fears. Ultimately, I hope to show that, while each message has arisen from a rupture in a relationship, everyone involved is driven by the same, timeless desire for connection. A lack of connection led Tina, Lenny, and Gail to run away, and a longing for reconnection compelled their relatives to reach out through the "Please Come Home" messages.

My own desire for connection, too, led me to set these messages to music. I wrote this dissertation during a turbulent period in my personal life. Relationships ended, began, and were reshaped. At many points, I felt alone and adrift as I tried to navigate these changes. In many ways, writing *Please Come Home* was an attempt to make port—to establish connections again, however abstractly. I wrote the work to connect with Tina, Lenny, Gail, and their relatives, who I

felt understood my situation, and I wrote it to, in some small way, connect with you, the listener. I may never meet you, or even know of you, but perhaps, if only briefly, we can find a shared *home* in this musical experience.

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