

# ‘Shapes Overlapping Like Endless Venn Diagrams’

An Exploration of Interpersonal Communication and Relationships  
while Directing *Photograph 51* by Anna Ziegler

Elisabeth Anne Collins  
Department of Theatre and Dance

## *Thesis Committee*

Theodore Stark  
Department of Theatre and Dance

Angela Thieman Dino  
College of Engineering and Applied Science Engineering Leadership Program

Markas Henry  
Department of Theatre and Dance

University of Colorado at Boulder

Defense Date: March 19, 2018

### **Abstract**

In order to understand how the working relationships between the collaborators at King's College, London – Rosalind Franklin, Maurice Wilkins, Ray Gosling, and Don Caspar – and the collaborators at Cambridge University – James Watson and Francis Crick – failed or succeeded in Anna Ziegler's play *Photograph 51*, I investigated the characters' interpersonal interactions through a model of relationship integration and disintegration, their individual conflict management styles, the characters' use of supportive and defensive communication, and the characters' use of confirming and disconfirming behaviors. I utilized stage pictures, lighting and scenic design, and a combination of projections and costuming to display the nature of these interpersonal interactions onstage. I used the same relationship theories to inform my directing and facilitate an effective and positive production process.

## Table of Contents

Introduction.....	4
Part One: Play Analysis .....	4
Play Summary.....	4
Play Analysis .....	6
The Production Process.....	17
A. Proposal.....	18
B. Casting.....	18
Part Two: Research on Communication Theories .....	21
Theory of Relationship Integration and Disintegration .....	21
Variations in Conflict Management Styles .....	26
Supportive and Defensive Behaviors.....	28
DNA Replication Bubble Metaphor .....	35
Part Three: Concept and Design Elements .....	40
Stage Pictures.....	40
Lighting and Scenic Design .....	42
Lighting Design .....	42
Scenic Design.....	43
Projections and Costuming .....	47
Projections.....	47
Costuming .....	47
Part Four: The Directing Process.....	49
How Relationship Integration Informed Ensemble Building .....	49
How I Dealt with Conflict.....	51
How I Avoided Defensive Communication Styles While Directing .....	54
How Confirming Behaviors Positively Influenced My Directing .....	55
Part Five: Conclusion.....	57
Appendixes: .....	61
Appendix A: Production Proposal .....	61
Appendix B: Production Schedule.....	65
Appendix C: Daily Call Example .....	65
Appendix D: Rehearsal Journal .....	66
Appendix E: Rehearsal Notes Sample .....	76
Appendix F: Production Video .....	76
Appendix G: Music Selections .....	76
Appendix H: Projections.....	80
Appendix I: Stage Pictures Analysis and Design Photos .....	80
Appendix J: Performance Feedback .....	80
Appendix K: Post Mortem Notes.....	81
Works Cited .....	82

## Introduction

For centuries, the theatre has depicted the struggles and conflicts of humanity. Human relationships are frequently at the heart of these conflicts. Behavioral sciences, such as communication theory, focuses on human behavior and relationships. Communication theory, especially as it relates to interpersonal communication, can be used to inform theatrical performance. Therefore, I decided to apply interpersonal communication theory throughout the process of directing *Photograph 51* by Anna Ziegler. This paper addresses how I applied communication theory to the production and direction of *Photograph 51*. I investigate my production process through the lenses of Knapp and Vangelisti's model of relationship integration and disintegration, Thomas and Kilmann's five types of conflict management, Gibb's model of supportive and defensive behaviors, and Sieburg's theory of confirming and disconfirming behaviors. I discuss how these interpersonal communication theories enabled me to analyze the interpersonal relationships between the play's characters, informed my design choices, and shaped how I approached the directing process to create positive relationships between my ensemble and myself. After analyzing the play, I will examine what the theories entail, how I applied them to my design, and how I used them to influence my interpersonal interactions as a director.

## Part One: Play Analysis

### Play Summary

*Photograph 51* by Anna Ziegler tells the story of Dr. Rosalind Franklin and the race to discover the structure of DNA. Set in England from 1951-1953, the play revolves around scientists at two institutions – King's College in London and Cambridge University. At King's College, Dr. Maurice Wilkins and Ray Gosling, a doctoral student, begin working with Dr.

Rosalind Franklin, an expert at x-ray crystallography. Their interactions do not start off on a good foot because they both have different expectations. Dr. Franklin believes she will be heading her own studies at the lab while Dr. Wilkins thinks she is coming to be his assistant. Their relationship and collaboration gradually disintegrate as small slights compound, even as Ray Gosling tries to keep the peace. Dr. Franklin also begins a collaboration with Don Caspar, an American doctoral student who respects her research and frequently corresponds with her about her work. Meanwhile at Cambridge University, Drs. James Watson and Francis Crick obtain Rosalind's data without her knowledge or consent and create a model of DNA's structure. Due to this work, Watson, Crick, and Wilkins received the 1962 Nobel Prize in Physiology or Medicine while Dr. Franklin's critical role in their success goes without credit. Since Rosalind dies of ovarian cancer before they win the award, she cannot demand credit or alter the way that they tell her story.

In *Photograph 51*, the five men, Maurice, James, Francis, Don, and Ray, serve as an omniscient (albeit biased) chorus telling Rosalind's story as they interact with her in a series of flashbacks. They tell her story with their knowledge of the future while she lives it as her present. The premise for our production was that Maurice Wilkins brought all the men together in a transcendent chorus space in an effort to change the outcome of the story and make things right both personally and professionally. In my approach to this production, we assume that Maurice has attempted to retell this story hundreds, perhaps thousands, of times.<sup>1</sup>

---

<sup>1</sup> I chose to give the actors this image because it highlights the tragedy of the story – the inability to change the past, no matter how hard one tries. This concept additionally creates a meta-theatrical parallel because the performance repeats each night, yet the ending can never change. James' line - "Not again, Wilkins. Really?" - indicates repetition and gave me the idea for this perspective on Ziegler's narrative framing (Ziegler, 11).

## Play Analysis

### Given Circumstances:

Multiple given circumstances create the context for this play including the geographical location, the climate, the date, and the economic, political, social, and religious environments.

- Geographical Location: Anna Ziegler states that the settings are “Many and various” (Ziegler 4). However, the play primarily takes place in England in the dingy underground laboratory at King’s College in London, the laboratory at Cambridge University, the Eagle Pub in Cambridge, Francis’ home in the Cambridge-Kent countryside, and an unnamed London restaurant. Action occurs outside of England when Don writes Rosalind letters from the United States, when Maurice and James attend a conference in Naples, and when Rosalind visits the Swiss Alps. Additionally, a great deal of narration and the final scene take place in the transcendent chorus space.
- Climate: England is cold, cloudy, and gloomy, both at King’s College in London and Cambridge University. The gloom of England provides a striking contrast with Paris – which Rosalind remembers fondly - and Switzerland – which is depicted in a stunning color projection when Rosalind visits it early in the play<sup>2</sup>.
- Date: The play spans the years 1951 through 1953, thereby covering various seasons, times of day, and dates. The chorus members usually mention relevant dates within the narration at the start of new scenes.
- Economic Environment: Both laboratories require funding from their respective universities to continue their work. Therefore, making progress in one’s research and keeping one’s research accurate, relevant, and interesting is paramount and an economic

---

<sup>2</sup> This colorful projection was utilized to contrast England’s gloom.

necessity.<sup>3</sup> Since Ziegler sets the play in post-World War II England, London is economically rebuilding after the Blitz.

- Political Environment: On a global level, World War II had just ended. The use of scientific innovation to bring about death and destruction on a military scale has now been replaced by an emphasis on studying the building blocks of life. For the colleges, discovering the structure of DNA will bring prestige, honor, and fame to the college and the scientists who uncover it. Colleges and deans thus are putting tremendous pressure on their faculty and research teams. Discovering the structure would ensure any scientist job security and the opportunity to continue researching a subject they find compelling.
- Social Environment: Competitive scientists frequently sacrifice a positive social environment as they contend for both recognition and funding. Therefore, the work becomes a 'race' and a competition for credit rather than a collaboration. In this period, few women work in science, and when they do, they frequently face discrimination. Sexism doesn't merely reflect cultural norms but becomes a tool for oppressing Rosalind in the competition to determine the structure of DNA. As Madeline Evangelista, the actor portraying Rosalind Franklin, astutely reflected during rehearsals "You [the men] have the privilege of being wrong, and I don't" (Evangelista).
- Religious Environment: Until Don Caspar arrives for his fellowship, Rosalind is the only Jewish person working at King's College. In the character descriptions, Ziegler mentions only Rosalind and Don's religion. Ziegler does not describe the rest of the characters as

---

<sup>3</sup> Both Maurice and James express concerns about maintaining funding. When Maurice makes an unfounded claim at a conference that the x-ray images from their lab indicate a helical structure, he tries to justify his actions by asking Rosalind "You want our funding to continue, don't you?" (Ziegler 28). Once James and Francis discover how DNA replicates, Francis asks James what this means and James gleefully states "It means there will always be the means to keep doing this. Forever" (Ziegler 48).

Jewish. Their Jewish identity sets them apart, in a post-World War II and post-Holocaust environment.

Dramatic Action:

- Basic Conflict: The scientists at King's College and Cambridge University compete, collaborate, or clash in their race to discover the structure of the DNA molecule.
- Previous Action:

In Paris, Rosalind received a letter from John Randall, the head of the Biophysics Research Unit at King's College, stating that she would be "heading up the study... [and] in charge of [her] own work" (Ziegler 13). She leaves her research position in Paris, a beautiful city that she adores, to work in gloomy London. Randall additionally informs Maurice that Rosalind will be his lab assistant. At King's, Ray has been working as Maurice's doctoral student and has been told that he will become Rosalind's doctoral student as soon as she arrives. At Cambridge University, Francis has been working on hemoglobin diffraction patterns. In Copenhagen, James, an American scientist, has been researching "the biochemistry of virus reproduction" (Ziegler 23). In the United States, Don has been completing his doctorate on "the chemical makeup of coal molecules" (Ziegler 19). In the transcendent chorus space, Maurice has just called the men together to retell the story of the race to discover the structure of DNA.

Turning Points:

- Maurice Wilkins discovers that Rosalind Franklin is not supposed to be his assistant.
- Maurice chooses to go to lunch somewhere women aren't allowed.
- Rosalind begins collaborating with Don Caspar.
- Maurice turns down working with James Watson.

- Maurice developing feelings for Rosalind.
- Rosalind turns down Maurice's offer of friendship.
- Maurice misrepresents Rosalind's work at a conference.
- Rosalind discovers the A and B forms of DNA.
- Rosalind and Maurice decide to work separately.
- Rosalind corrects the Cambridge scientists about the errors in their work.
- Rosalind takes Photograph 51.
- James sees Photograph 51.
- Don arrives to work with Rosalind.
- Don asks Rosalind to dinner.
- James Watson and Francis Crick use Rosalind's data to discover how DNA replicates.
- Maurice almost helps Rosalind. While this moment had the potential to improve their relationship, they fell into their old communication patterns and little changed.
- Rosalind takes a night off from work to go on a date with Don.
- Rosalind discovers she has ovarian cancer.
- Francis' wife leaves him.
- Rosalind dies.
- Maurice attempts to start the story over and bring Rosalind back to life.

#### Characters:

- Rosalind Franklin
  - Objective Within the Story: Rosalind wants to discover and prove the structure of DNA.

- Obstacles: Rosalind's obstacles include animosity from Maurice Wilkins, being looked down upon by her peers, others' looking at her data without her knowledge or her consent, and humidity leaking into her x-ray camera.
- Character Development: Initially Rosalind wants to collaborate, but after multiple altercations with Maurice she begins to isolate herself. She regains her trust in collaboration as she corresponds with Don Caspar and works with her graduate assistant, Ray Gosling. However, once Rosalind comes to a mental roadblock in her work, she begins questioning if placing her life's work ahead of her happiness has been worth it.
- Maurice Wilkins:
  - Objective Within the Story: Maurice wants to discover the structure of DNA.
  - Objective as the Chorus: Maurice wants to change the ending to Rosalind's story.
  - Obstacles:
    - Maurice's obstacles to his objective within the story include animosity from Rosalind, losing the better sample of DNA to Rosalind, and James and Francis encouraging him to disclose his research so that they can discover the structure first.
    - Maurice's obstacles to his objective as the chorus include the men's disinterest in telling this story again, the fact that he cannot change the past, and the fact that he cannot truly bring Rosalind back from the dead.
  - Character Development: Maurice initially begins work with Rosalind under the erroneous assumption that she is supposed to be his assistant. Later after realizing that he has been alienating her, he tries to connect with her and develops feelings

for her. However, she rejects his offer of friendship. Having distanced himself from Rosalind, Maurice becomes closer to James Watson and Francis Crick, inadvertently giving them information about Rosalind's research. At the end of the play, he desperately wants to change the past. However, he learns that this is not possible.

- James Watson
  - Objective Within the Story: James wants to 'win the race' to discover the 'secret of life' no matter what it takes.
  - Objective as the Chorus: James wants to relive his story of attaining scientific glory.
  - Obstacles:
    - Obstacles to James' objective within the story include Francis' disapproval of his methods, lack of 'cooperation' from King's College scientists – especially 'Rosy,' his own lack of attention to detail, and competition from the King's College scientists and American scientist Linus Pauling.
    - The obstacle to James' objective as the chorus occurs when others express perspectives that contradict his internal narrative.
  - Character Development: James begins the play as an earnest scientist willing to do anything to discover the world's secrets and make his name known. By the end of the play, he has learned how to collaborate with Francis and becomes comfortable with unethical business practices. He has no regrets and looks back on his actions proudly.

- Francis Crick
  - Objective Within the Story: Francis wants to make a difference in the world by discovering the structure of DNA.
  - Objective as the Chorus: Francis wants to support his friend Maurice Wilkins.
  - Obstacles:
    - Obstacles to Francis' objective within the story include James' ambition, James' lack of academic integrity, and competition from the team at King's College and American scientist Linus Pauling.
    - Obstacles to Francis' objective as chorus include the inability to change the past and his desire not to see Maurice embarrass himself.
  - Character Development: Francis begins the story as a hardworking and ethical scientist. Due to the influence of James Watson, he compromises his integrity when he utilizes information that James unethically obtained from Dr. Rosalind Franklin. By the conclusion of the play, he realizes that his passion for his work has alienated him from his wife and wonders if discovering the structure was worth that loss.
- Don Caspar
  - Objective Within the Story: Don wants to earn his doctorate and enter into a professional (and later a personal) relationship with Dr. Rosalind Franklin.
  - Objective as the Chorus: Don wants to tell Rosalind's story accurately – making sure that the other characters' testimonies don't diminish her scientific contribution or her humanity.

- Obstacles:
  - Obstacles to Don's objective within the story include his own lack of direction and the initial delay of Rosalind's reply to his letter.
  - Obstacles to his objective as the chorus include multiple narratives from the other male characters and individuals' desire to avoid blame for the story's outcome.
- Character Development: Don Caspar begins the play as a doctoral student with potential self-esteem issues and a slightly unclear direction for his dissertation. Through writing and collaborating with Rosalind, he finds personal and professional purpose, earns his doctorate, and becomes far more confident about his ability to create quality scientific research. He falls in love with Rosalind but fails to express it to her, cutting off the potential for a romantic relationship.
- Ray Gosling
  - Objective Within the Story: Ray wants to earn his doctorate by helping Rosalind and Maurice with their research.
  - Objective as the Chorus: Ray wants to tell Rosalind's story accurately and objectively.
  - Obstacles:
    - Obstacles to Ray's objective within the story include the frequent conflict between Rosalind and Maurice, not knowing as much about DNA and crystallography as the other scientists, and being left out of important scientific meetings.

- Obstacles to his objective as the chorus include each character's inherent bias and occasional animosity between Maurice, Don, James, and Francis.
- Character Development: At the beginning of the play, Ray Gosling takes little initiative because he is a doctoral student at the whim of whoever is his current advisor. By the end of the play, he takes more initiative in his interactions and provides suggestions about work the lab could do. Throughout the play, he remains loyal and supportive to his colleagues.

### Language:

The use of scientific language and titles are critical to understanding the scientific concepts and power dynamics within *Photograph 51*. Ziegler utilizes accurate scientific language throughout the play. However, in an effort not to confuse the audience, she frequently explains complex scientific ideas in layman's terms. The following dialogue between James and Francis provides an excellent example:

DON: After looking at Rosalind's report, they made a conclusion she had yet to draw: that DNA consisted of *two* chains running in opposite directions, a pair of endless spirals that work together but will never meet.

FRANCIS: Which is how it replicates, Watson. That's how it works.

JAMES: Each strand is a template and in each template is another helix and on and on forever. (Ziegler 47)

Ziegler includes the scientific explanations through two smart framing devices. She has the scientists explain their ideas to each other, or she has them express their thought processes as

they discover something. Ziegler's ability to seamlessly explain complex concepts throughout the play is quite remarkable.

The other noteworthy use of language is Ziegler's use of titles throughout the play. The variation among titles used is essential in establishing respect and disrespect among characters. This is most prevalent in the use of "Miss" and "Dr." when referring to Rosalind Franklin. Although Rosalind earned her doctorate and should be addressed as "Dr. Franklin," Maurice continually refers to her as "Miss Franklin," even after she expresses her displeasure in his doing so. Don Caspar, on the other hand, addresses Rosalind as "Dr. Franklin" in all his correspondence, thereby beginning their relationship on a foundation of respect. Strangely enough, Ray also refers to Dr. Franklin as "Miss." However, his gaffes appear to be taken more lightly, possibly because he repeatedly supports Rosalind and her work. The title "Miss" carries extra weight because it refers to her unmarried status, a status that shocks Ray early in the play. In a gesture that shows disrespect, James repeatedly refers to Dr. Franklin by anything other than her title. He calls her "girl," "lovely Rosalind," "a right old hag," "you-know-who," "our little ray of sunshine" (Ziegler 34, 38, 40, 42, 44). Strangely enough, James never actually refers to her as Rosy, although his historical counterpart did so quite frequently<sup>4</sup>. He only references it once, somewhat sarcastically, in the following dialogue.

“WILKINS. I think as far as Rosy is concerned.

WATSON. She doesn't sound particularly rosy to me.

CRICK. Does she how you all still call her that behind her back?

WILKINS. Are you joking? She'd have us skinned.

---

<sup>4</sup> In James Watson's 1968 book The Double Helix: A Personal Account of the Discovery of the Structure of DNA, he uses her name Rosalind only five times, while he refers to her as Rosy a total of 82 times (Watson).

WATSON. I can't wait to meet her.

WILKINS. Oh trust me. You can wait." (32)

Due to the sarcasm and negative connotations associated with this nickname, Rosalind dislikes being called "Rosy" until Don Caspar uses it in an affectionate way later in the play. The following interaction occurs when he calls her "Rosy" for the first time.

"ROSALIND. Would you excuse me, Dr. Casp – *(She brushes against him, just a little.)*

Oh I'm sorry.

CASPAR. *(Straightening)* It's fine.

ROSALIND. I was just...

CASPAR. It's fine, Rosalind. *(Beat.)*

ROSALIND: *(Taking offense.)* What's happened? You got your degree and somehow I lost mine?

CASPAR. I'm sorry – *Dr. Franklin...* It's just.

ROSALIND. What?

CASPAR. I like your name... Rosalind... Rosy.

ROSALIND. Why?

CASPAR. It's warm. It makes me think about coming inside to a fire after a walk in the bitter cold." (Ziegler 46)

In using the nickname "Rosy," Don's actions vary from the actions of the other men. He uses the nickname kindly and not in a demeaning or dismissive manner. Most importantly, in their interaction, he demonstrates that he will gladly refer to her as Dr. Franklin once again if she prefers the use of her title.

Titles hold similar importance for the men, yet their requests to be referred to as “Dr.” are acknowledged and accommodated. Both Maurice Wilkins and James Watson correct others when they are erroneously referred to as “Mr.” instead of “Dr.” In these instances the individuals to whom they are speaking immediately adjust their language accordingly.

The third scene focusing on the letter sent between Rosalind and Don emphasizes the double standard created around titles. Rosalind describes how men and women are treated differently after earning their degrees when she tells Don,

This title that’s now been conferred on you... It means windows have been flung wide, letting in the cold night air, that streetlamps will blink on as you walk past them. In 1945, when I got my doctorate, I thought those letters you’ve now acquired would have the same value for me, but of course you and I well know this is not the case.” (Ziegler 37)

### **The Production Process**

My interest in Rosalind Franklin’s story began at age six when I watched the NOVA documentary *Secret of Photo 51*. My father claims that my anger at the injustices committed against Rosalind Franklin as a female scientist turned me into a “raging feminist.” When I read Anna Ziegler’s *Photograph 51* for the first time in 2015, the interpersonal relationships and relatively accurate depiction of the race to discover the structure of DNA fascinated me. So, once the opportunity arose, I jumped at the chance to propose it as a Studio Production at CU Boulder.

On October 31, 2016, I submitted a proposal for *Photograph 51* to the CU Theatre’s Season Planning Committee. They approved the proposal on January 30, 2017. Over the summer, I developed my director’s concept and my scenic, lighting, projection, and costume designs. Department-wide auditions and callbacks for *Photograph 51* were held on August 26, 2017. Casting for the fall semester shows occurred on August 27<sup>th</sup>. My rehearsals began two

weeks later on September 11<sup>th</sup>, giving us four weeks of rehearsal to stage a 90-minute show. We added technical elements to our production during tech weekend on October 7<sup>th</sup> and 8<sup>th</sup>. Finally, performances began on October 11<sup>th</sup> and continued through October 16<sup>th</sup>. Strike was held immediately after the final performance. We concluded our production process with a “post-mortem” on October 20<sup>th</sup>. The proposal, the process of casting, the structure of rehearsals, performance feedback, and the post-mortem discussion were valuable learning experiences.

### **A. Proposal**

The production proposal I submitted to the Season Planning Committee on October 31, 2017 is in Appendix A. The production evolved a moderate amount after the submission of the proposal. To provide a glimpse into how the production evolved after its initial conception, I marked all changes to the proposal as footnotes.

### **B. Casting**

The casting process began with department-wide auditions held on August 26<sup>th</sup>, 2017. After the initial audition, I called back actors, so they could read a variety of sides, short sections of the script. I wanted to see if they would showcase the essence of the characters or have chemistry with other actors onstage. Each of the actors I cast fit my requirements well. Each of them could portray the essence of the character I envisioned or could learn to portray it.

For Rosalind Franklin, I looked for an actress who could handle Rosalind’s serious and straightforward manner while still bringing joy and humanity to this character. I cast Madeline Evangelista as Rosalind because she embodied Rosalind’s gravitas, could easily hold her ground, and had a hard work ethic. Even though she was shorter than all her fellow actors, her stage presence helped her command the space and the attention of the audience, similar to how Rosalind would have had to command the attention of her male colleagues. The slight visual

similarity between Madeline and Rosalind was helpful, but not a determining factor in her casting. Madeline's strong work ethic, attention to detail, and passion for the play made her an ideal Rosalind.

I cast Bennett Cross as Maurice Wilkins due to his ability to create subtle beat changes<sup>5</sup>, his potential as a romantic lead, and his ability to inhabit Maurice's regret without letting it overwhelm him. He didn't let the idea that Maurice was a wounded soul become the character's only defining trait. He managed to combine Maurice's strength and pain without appearing "bumbling or buffoonish" (Ziegler 8). The uncanny visual similarity between Bennett and the actual Maurice Wilkins was a bonus.

Todd Kremer brought humanity and honesty to his audition for Francis Crick. The presence of humanity in his performance was critical because I wanted the audience to be able to see Francis' perspective instead of merely vilifying the Cambridge University scientists. Additionally, Todd makes his performances quite dynamic with his ability to improvise and experiment throughout the rehearsal process. I had previous experience working with Todd in our BFA Performance classes. From my experience, I knew that he was a hard worker, yet I foresaw that there could be difficulties in the power dynamic between the two of us. Since we were the same age and had the same level of experience, the dynamic of director and performer could become strained.

James Watson's character required a great deal of drive, a thirst for knowledge, and an aggressive ambition. While Michael Tandy's initial audition did not have quite the level of drive I was looking for in James, I knew that he could rise to the challenge and easily adapt his performance. When I previously directed him in a scene for my directing class, I discovered that

---

<sup>5</sup> A beat change is when the character switches the tactic they are using to get what they want.

he was an extremely hard worker that enjoyed feedback, continually improved his performance, and quickly rose to acting challenges. Having worked with Michael in the past through the Interactive Theatre Project, I knew that he could handle being an antagonist without letting the role take an emotional toll on him. Additionally, Michael brought positive energy to rehearsal that quickly spread throughout an ensemble.

Considering that Ray Gosling provides a great deal of the humor within *Photograph 51*, I needed an actor who had comedic timing and genuine enthusiasm. I cast Jeremy Segelke in this role because of his potential for fantastic comedic timing. Before this production process, he didn't believe that he had a knack for comedy, but with a little bit of coaching, his sense of comedic timing significantly improved. His hard work ethic and passion for his work on and offstage were valuable contributions to the ensemble.

Don Caspar's character required potential as a romantic lead and the ability to be easily empathetic, slightly self-deprecating, and earnest. I cast Jack Janzen in this role because he read wonderfully at callbacks and I wanted to give him an opportunity to expand his range into the realm of a romantic lead. Additionally, Jack had expressed interest in the script and was quite passionate about the story. I would rather cast an actor who is passionate about the work than one who is indifferent. Jack brought a hard work ethic, a desire to grow as an actor, and a focused attitude to each rehearsal.

At the casting meeting on August 27<sup>th</sup>, the directors made lists of their ideal casts on the wall. The majority of my original casting choices didn't overlap with any other directors, which made negotiating for the remaining roles much easier.

## **Part Two: Research on Communication Theories**

Assuming that the individuals involved in the race to discover the structure of DNA all had equivalent intelligence, opportunity, and time to discover the structure, the most significant variable that changed was the quality of the interpersonal relationships within the laboratories. The quality of these relationships either facilitated or hindered progress towards discovering the structure of DNA. Since this play frequently focuses on the ideas of shape and structure, I analyzed the structure of the interpersonal relationships through four interpersonal communication theories: Knapp and Vangelisti's model of relationship integration and disintegration, Thomas and Kilmann's five types of conflict management, Gibb's model of supportive and defensive behaviors, and Sieburg's theory of confirming and disconfirming behaviors.

### **Theory of Relationship Integration and Disintegration**

To understand how relationships integrate and disintegrate, I investigated three relationships: Dr. Rosalind Franklin and Don Caspar, Dr. James Watson and Dr. Francis Crick, and Dr. Rosalind Franklin and Dr. Maurice Wilkins.

The positive interactions in the play between Rosalind and Don and between James and Francis follow Knapp and Vangelisti's five steps of relationship integration:

1. Initiating – introductions,
2. Experimenting – getting to know one another,
3. Intensifying – becoming closer,
4. Integrating – thinking of things as *ours*, and
5. Bonding – establishing an official relationship. (Knapp and Vangelisti 37–42)

Rosalind and Don initiate by introducing themselves through letters, experiment by getting to know each another's perspectives on x-ray crystallography and scientific work, intensify by sharing personal insights on the struggles inherent in Rosalind's working situation, and integrate by thinking of work as 'theirs' when Don says "Soon enough *we'll* be building a model" (Ziegler 49). However, they do not reach the final phase of bonding because the potential romantic interest is not reciprocated, as shown when Rosalind asks Don to go home and the following dialogue ensues:

DON: How could you possibly think I'd leave you here all alone?

ROSALIND: But why would you stay?

DON: Because I like you.

ROSALIND: (*Sadly; this isn't possibly enough.*) You like me." (Ziegler 55)

While Rosalind and Don do not complete all five steps, full relationship integration can be seen in the relationship between James and Francis. When the two are introduced, thereby fulfilling the initiating step, Francis asks James how he would like to be addressed or if he has any nicknames. By expressing an interest in James' preferences, he displays that he values James' opinion. When James replies, "How about I tell you and you don't have to keep guessing," James lays the foundation for the joking rapport they later develop (Ziegler 24).

Their experimenting phase manifests through the experimental use of humor. Over the course of the play, James and Francis discover which kinds of jokes they can make around each other. James learns that while Francis doesn't mind too much if he makes fun of the roasts that Francis' wife makes, Francis will not tolerate James if he makes lewd jokes about her thighs. The two of them find that they both enjoy making jokes about each other's idiosyncrasies. James makes fun of the elevated language that Francis uses (Ziegler 38–39) while Francis makes fun of

how James acquires his scientific information (Ziegler 49), yet this bolsters their friendship rather than hindering it.

Francis and James' relationship mostly intensifies offstage. However, portions of their dialogue indicate that they have grown closer. During their brunch with Maurice at Francis' home, both Francis and James indicate that they know a great deal about the other's personal life. Francis describes James' inability to get a date, while James makes comments about Francis ogling women who are not his wife. Later in the same scene, Francis mentions that James visits his home quite frequently. During this stage, Francis and James became closer by increasing their number of interactions and the amount of personal information they share with each other.

Their relationship finally integrates once they begin building the second DNA model. After James sees Photograph 51 without Rosalind's knowledge or consent, he immediately shows a sketch of it to Francis. When Francis agrees to start working on a model based on Rosalind's work, he implicitly colludes with James' act of academic dishonesty. Although they already had a professional relationship, the knowledge of this act links them together forever. After this point, they even collaborate in manipulating Maurice; while Francis tries to ask Maurice for permission to utilize his work, James doggedly questions Maurice to obtain more information about Rosalind's work. After writing their paper on the double helix structure of DNA, their bonding was complete. The names Watson and Crick would be linked forever due to their discovery of the double helix of DNA. The public frequently thinks of them as a single unit, as Watson *and* Crick rather than Watson *or* Crick.

Even more significant than the integration dynamics of the two relationships described above are the relationship disintegration dynamics between Rosalind and Maurice. As Ziegler states in her author's note, the moments when the characters almost come together and barely

miss “make up the heart and the tragedy of *Photograph 51*” (Ziegler 6). If relationship integration involves an increasing level of bonding between two individuals, then relationship disintegration involves the decay of that bond. The negative relationship between Rosalind and Maurice follows the pattern of relationship disintegration, illustrated by Knapp and Vangelisti in five steps:

1. Differentiating – thinking of something as *mine* or *yours*,
2. Circumscribing – avoiding topics that go badly whenever they are mentioned,
3. Stagnating – not talking to each other,
4. Avoiding – going out of one’s way not to be in the same space at the same time, and
5. Terminating – ending the relationship. (Knapp and Vangelisti 43–47)

While their pattern doesn’t necessarily follow the steps in order, they do display four of the five steps.<sup>6</sup>

Rosalind and Maurice differentiate when they stop sharing their work with each other and begin identifying research materials as *mine* or *yours*. This step starts when Rosalind displays a hesitation to show Maurice her work after he returns from a conference. After he gives a lecture at the conference that misrepresents her DNA work, their relationship drastically shifts. In the following beat, Rosalind clearly states “I will not collaborate and I don’t appreciate his desire to infringe on *my* material” (Ziegler 29; emphasis added). They literally separate their areas of research at the end of the beat when Rosalind tells Maurice, “I’ll take the A form. And you can have B” (Ziegler 30). Maurice initially expresses frustration with the differentiation of their research. Approximately halfway through the play, he states “she’s keeping me from my own work. And she has all the best equipment, not to mention the best samples. She’s hoarding

---

<sup>6</sup> Since Rosalind’s death is not an *intentional* end to their relationship, their relationship did not reach this final stage.

everything” (Ziegler 31). Towards the conclusion of the play, he has grown accustomed to differentiation as the status quo. Maurice almost sounds resigned when he states “essentially A and B have become hers. I’m not quite sure how it happened, but it happened” (Ziegler 45). Rosalind, on the other hand, appears to embrace and enjoy the differentiation of their research because she “[doesn’t] like others to analyze [her] data, [her] work” (Ziegler 13). Rosalind’s preference for working alone contributes to the disintegration of her relationship with Maurice.

Maurice and Rosalind begin circumscribing when they avoid discussing topics that end badly: talking about World War II, speaking about the Jewish people, mentioning laziness, or addressing Rosalind as “Miss Franklin” instead of as “Dr. Franklin.” While the subjects of World War II and the Jewish people are mentioned during their first interaction, the subjects do not arise within their subsequent conversations. The playwright could have made a deliberate decision not to bring up these subjects again in order to focus on the events currently taking place over the course of the play instead of dwelling on the past. Yet Rosalind chooses to discuss both subjects with Don later in the play. This indicates that while Rosalind is comfortable speaking to a fellow Jewish person about these subjects, she is not comfortable discussing these topics with Maurice due to Maurice’s unpleasant response during one of their early conversations. Due to Rosalind’s unfavorable response at the end of their discussion about Shakespeare, the two of them never discuss their shared passion for the Bard’s works again during Rosalind’s lifetime, as seen in the following dialogue:

WILKINS. My grandfather committed a great number of Shakespeare’s plays to memory. It was impressive. I’ve always wished I could do the same.

ROSALIND. Then why don’t you do it?

WILKINS. I don’t know. Laziness?

ROSALIND. Laziness?

WILKINS. Haven't you heard of it?

ROSLAIND. I don't believe in it.

WILKINS. No. I suppose not. (Ziegler 18–19)

Additionally, Rosalind never addresses how Maurice continues to refer to her as “Miss Franklin” although he should refer to her as “Dr. Franklin.” After he did not heed her request during her attempt to rectify the situation, she never brought up the subject again during the play.

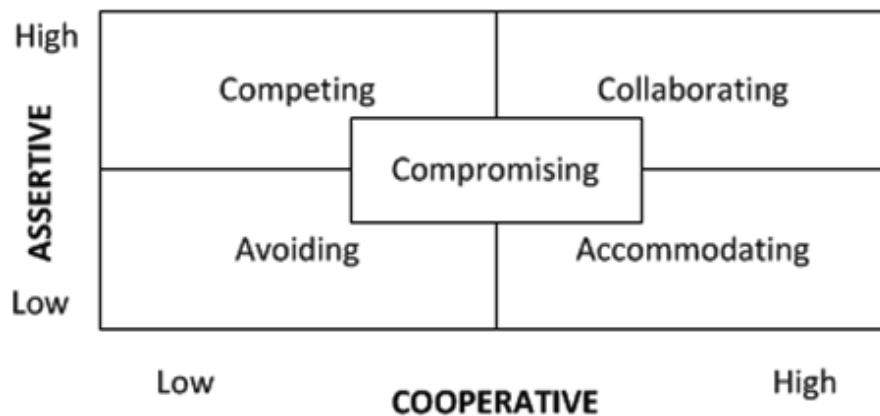
Stagnation begins to occur within their relationship in the scene where Rosalind and Maurice solely communicate through Ray. Their decision to use Ray to speak to each other appears quite childish and indicates a large disconnect within their relationship. When speaking through Ray eventually frustrates them, they speak to directly to each other only to decide that they should work separately.

Thus, Rosalind and Maurice enter the fourth stage of relationship disintegration – avoiding. By working in separate spaces and not speaking to each other, they hardly interact. For the second half of the play, they only talk to each other one-on-one for two and a half pages out of the 27 remaining script pages before Rosalind dies. They speak to each other when he offers to help her through her mental roadblock and when she finds him sitting in her office in the dark. All of their other interactions involve at least two other people and do not require them to speak to each other. By avoiding each other, they eliminate potential opportunities to heal their relationship.

### **Variations in Conflict Management Styles**

Since *Photograph 51* deals with a significant amount of interpersonal conflict, I wanted to more thoroughly understand the characters by understanding how they each deal with conflict.

To assess their respective conflict management styles, I utilized the two-dimensional model of conflict. While Thomas and Kilmann initially created this conflict theory, it has been used and refined by many authors since then (Thomas and Kilmann). The following diagram they created clearly and concisely establishes the five styles of conflict management:



**Fig. 1:** Styles of Conflict Management (*Image*)

The two dimensions that define conflict management styles are how assertive an individual is and how willing they are to cooperate. For example, someone who collaborates would show a high level of assertiveness and a high willingness to cooperate. The image above helps display where each style of conflict management exists upon these two dimensions.

Within *Photograph 51*, all five conflict management styles, competing, collaborating, compromising, avoiding, and accommodating, are utilized. Competition is clearly James' preferred method of conflict management. He thinks that trying to find the structure of DNA is a race. This manifests itself in very assertive behavior towards the other characters onstage and explains why he frequently utilizes unethical tactics to reach his objective instead of cooperating with others. Don and Rosalind show their inclination towards collaboration through their frequent correspondence and their discussion of potential future work later in the play. While both are assertive individuals, they view their work as serving a greater purpose – contributing to

the store of human knowledge – rather than as a means for personal gain. This belief and their mutual respect for each other’s work leads them to collaborate with each other. Unfortunately, compromising behavior occurs the least out of all the conflict management styles within the play. The most frequent instances of compromise occur when Ray tries to help Rosalind and Maurice see the other’s perspective. He tries to reconcile both of their positions and find a middle ground between their two extremes. While Ray cooperates with both Rosalind and Maurice, he is assertive enough to contradict them if they make an erroneous assumption about the other person. After Ray’s attempts to reconcile them no longer work, Rosalind and Maurice utilize avoiding behavior to manage their conflict. This correlates directly with the avoiding phase in their relationship disintegration under Knapp and Vangelisti’s model. By showing little desire to connect and little willingness to cooperate, they inevitably begin to avoid each other. Maurice uses accommodation, the final conflict management style, in the middle of the play. He wants to cooperate with Rosalind and decides to try to use “kindness” to win her over, a far less assertive approach than he was taking earlier (Ziegler 26). However, after he discovers that this approach does not affect Rosalind, their relationship disintegrates into avoidance.

### **Supportive and Defensive Behaviors**

Jack Gibb, a communication researcher, created the “Gibb Categories” – a series of categories of communication behavior to help create productive interpersonal communication. Communication can either be productive, due to supportive behaviors, or unproductive, due to defensive behaviors. Gibb identified that evaluative, controlling, strategic, indifferent or neutral, superior, or certain behaviors within communication “generally [prove] destructive and [set] up defensive reactions in the listener” (DeVito 253).

To understand Gibb's theory and how it applies to *Photograph 51*, I will briefly summarize each kind of communication and how it applies to various relationships throughout the play. My summary of the theory is based on DeVito's description of Gibb's theory in the third edition of the textbook Interpersonal Messages.

Evaluative communication occurs when a speaker begins to use judgmental statements to assess the listener's actions (DeVito 253). This leads to a communication breakdown because when the listener feels judged, they are more likely to begin defending themselves and become evaluative of the speaker. This behavior can be circumvented if a speaker uses descriptive statements rather than judgmental statements (DeVito 253). Evaluative communication occurs in *Photograph 51* during Maurice and Rosalind's altercation after Maurice claims that the x-ray photographs from their lab indicated a helix. Both Rosalind and Maurice use evaluative phrases and respond defensively to each other. When Maurice states that Rosalind is unwilling to see the helix within the images, Rosalind replies with criticisms about his character and insults the importance of his work. By utilizing evaluative communication, Maurice spurs Rosalind to become defensive and use more evaluative communication in response to him. Shortly after that when Rosalind uses a somewhat judgmental statement when she states that Maurice's actions are "self-aggrandizement at the cost of any kind of integrity," Maurice immediately tries to defend himself by retorting "You want our funding to continue, don't you?" (Ziegler 28).

Controlling communication occurs when someone orders someone else to do something. As a result, they are more likely to become defensive because "Control messages deny the legitimacy of the other person's contributions and in fact deny his or her importance" (DeVito 254). Both Rosalind and James frequently utilize controlling communication. In Rosalind's efforts to control her work, she frequently gives commands to Maurice and Ray. While giving

instructions to her doctoral student, Ray, is to be expected, the moments when she commands her research partner, Maurice, are more unusual and frequently place him on the defensive. For example, the following dialogue ensues after Rosalind separates their research and begins the differentiation stage of relationship disintegration:

ROSALIND. I'll take the A form. And you can have B.

WILKINS. Maybe *I'd* like A.

ROSALIND: Maurice, you're being ridiculous.

WILKINS. Fine. B it is. (Ziegler 30)

At this moment, Rosalind issues a command followed by an evaluative judgment to get her own way. Maurice responds defensively, trying to assert his desires. Her response disregards his opinion and belittles him, thereby demeaning his opinion. While she achieves the outcome she desires, using this language to obtain this outcome further damages her relationship with Maurice.

Strategic communication occurs when the speaker is trying to get something from the listener by manipulating people or situations. This kind of behavior leads to resentment and defensiveness because listeners feel that they are being used and that the speaker values them far less than they value their end goal (DeVito 254). This form of communication can be combatted by creating an atmosphere of spontaneity and honesty. Francis and James utilize strategic communication when they invite Maurice to the Cambridge-Kent countryside for brunch. James doggedly questions Maurice about the work at King's College. Although Maurice initially perceives that James is merely curious and making friendly conversation, he realizes that he may have been manipulated at the end of the scene when they ask for his permission to build a model. After hearing this news, he responds, "Look, if I'd known you were going to do another, I

wouldn't have.... Said so much, I suppose. Or shown you..." (Ziegler 46). Maurice's response suggests that he feels used and manipulated by his friends. James and Francis' manipulation even goes one step further, because they do not inform him that they began building the model before asking for his permission.

Indifferent or neutral communication shows a lack of interest in or caring for the other person. Demonstrating empathy is the best way to counteract this category of behavior (DeVito 254). Indifferent communication rarely occurs in the play, as neutrality and indifference are seldom useful for driving a plot forward. The only instance of indifference that arises is Maurice's indifference regarding Rosalind's preference to be referred to as "Dr. Franklin." Maurice does not realize that continually referring to Rosalind as "Miss Franklin" could be insulting because he is "simply a product of his times" (Ziegler 5). He views it as neutral, as mundane as saying someone's name. Maurice's indifference contrasts Don's empathy. Don's ability to understand Rosalind's perspective and what might offend her helps him build a much better foundation for their relationship. Since Don genuinely cares about her, instead of being indifferent, he quickly notes moments when she seems upset and adjusts his behavior accordingly.

Superior communication occurs when one presents oneself as a superior individual. Communicating with this mentality makes the individuals with whom one is communicating feel that they are being perceived as "less than" or inferior. As DeVito states, "It's a violation of the implicit equality contract that people in a close relationship have – namely, the assumption that each person is equal" (254). This kind of communication frequently occurs between Rosalind and James. When Rosalind informs James and Francis about the error in their first DNA model, James doesn't believe that their model is incorrect until Maurice confirms it. When James states

“You just don’t want to admit it’s right,” he assumes that Rosalind is mistaken because he believes that his intellect and understanding of science are superior to hers (Ziegler 33). He displays this attitude when he visits her in the lab when he tells her “It overwhelms you. I can see that. So share your research with me. I mean, you’re not going to get it on your own” (Ziegler 39). This display of superior communication upsets Rosalind, puts her on the defensive, and motivates her to kick James out of her lab.

Certain communication occurs when one individual makes it appear as if they know everything (DeVito 254). This leads to resentment from the other party and undermines the possibility of collaborating or problem-solving. When James visits Rosalind’s lab, he combines superior behavior with certain behavior when he begins lecturing Rosalind about how she isn’t interpreting her data correctly. The two of them do not enter into a productive conversation about Rosalind’s work because he is certain that he can interpret her data more effectively and therefore knows more than she does. By dismissing her expertise, he closes himself off from collaborating with Rosalind in the future.

### **Confirming and Disconfirming Behaviors**

To enhance the interpersonal conflicts between characters and help the audience perceive these conflicts, I intentionally emphasized the confirming and disconfirming behaviors of the characters. As Evelyn Sieburg states,

confirmation suggests awareness of others, accurate perception of them, recognition of their attempt to communicate, endorsement of their self-experience, and a willingness to relate to them. Disconfirmation reflects unawareness of others, misperception of them, rejection of their attempt to communicate, denial of their self-experience or disaffiliation with them. (Sieburg 146)

Confirming behaviors include: active listening, giving other individuals your complete attention, making eye contact, and having two-sided dialogue. Each of these behaviors confirms that one values the other individual as a person. Disconfirming behaviors include: ignoring others, working on other tasks instead of listening to others, not making eye contact, literally turning one's back on another individual, and having a one-sided dialogue. On the other hand, each of these behaviors disconfirms the assumption that one values the other individual as a person.

Since some of these behaviors were not directly stated in the script's stage directions, I decided to include some confirming and disconfirming behaviors in my blocking. I only included such moments if they were supported by textual evidence or did not detract from Ziegler's story.

To display confirming behaviors, I encouraged Rosalind and Don to make eye contact whenever they saw fit during the second and third letter scenes. During the first letter scene, they only made eye contact once; therefore, I asked them to increase the amount of eye contact as they read subsequent letters because Rosalind and Don continue to confirm that they value each other as they grow closer and their connection grows stronger. Considering that Francis and Maurice are already close friends, I tried to ensure that Francis displayed more confirming behaviors towards Maurice than James did in the brunch and bar scenes. In a scene where something was bothering Maurice, Francis' attention was clearly on him while James just continued to try to obtain more information from Maurice. In this manner, Francis' attentiveness confirmed Maurice and contrasted with James' disconfirming behavior of ignoring Maurice's emotional distress and body language.

To display disconfirming behaviors, I encouraged characters to be absorbed in their work, ignore each other's body language, and change their body position to exclude others. During the first scene between Rosalind and Maurice, I encouraged Maurice to get absorbed in his work

instead of his conversation with Rosalind. I had this idea when I realized that he repeated himself in the following line: “You see... we now feel that if we discover *this* structure – this structure – we could discover the way the world works” (Ziegler 13). I decided to have him become absorbed in his work because it helped justify a line, showed disconfirming behaviors towards Rosalind, and allowed Maurice to reveal his passion for his work. Maurice’s disconfirming behaviors continue when he ignores Rosalind’s request to be referred to as “Dr. Franklin” and ignores her body language when he decides to go to lunch in the senior common room. Bennett Cross and I discussed how many of these disconfirming behaviors were unintentional. Since most of the behaviors showed indifference towards Rosalind, we tried to strike the right balance in his performance so that Maurice’s disconfirming behaviors could be seen as unintentional from his perspective and intentional from Rosalind’s perspective. A similar accidental instance of disconfirming behavior occurred when Ray and Maurice speak only to each other after seeing James and Francis’ erroneous model. I noticed in the text that none of their conversation was directed towards Rosalind, although she was probably still with them because they were all together in the last scene. Therefore, instead of having her leave the stage as I had originally intended, I had her stay onstage and blocked Maurice and Ray, so their backs were to her during their brief discussion. This physical disconfirmation helped bolster the text and created another moment of disconnection within the play. Thinking of individual moments as confirming or disconfirming another individual’s value helped me find more dynamic images while blocking. For a full breakdown of how I utilized confirming and disconfirming behaviors within my blocking, see the production photographs and my commentary on the motivations behind my blocking decisions in Appendix I.

## **DNA Replication Bubble Metaphor**

In the months before the production, I struggled to find a metaphor to encapsulate what I found important about the play – what makes or breaks interpersonal relationships. I continued to notice moments throughout the script which separated characters and broke apart relationships and moments when characters joined together and collaborated to make progress towards discovering the structure of DNA. One day I was contemplating these moments and thinking about the fascinating properties of DNA when I realized that the development of the relationships in the play mirrors how a DNA replication bubble progresses along a strand of DNA. Therefore, to visually represent this idea, I utilized PowerPoint to create an animation of a DNA replication bubble that would progress as the relationships within the play developed and changed. Each of the characters would be represented by a component of the replication process which matched the color of their costume.

When DNA replicates, the strands of DNA split apart from each other, similar to how a zipper un-zips. I included a description of how a DNA replication bubble works on the back of the program to give my audience context for the metaphor. The program and the description of how DNA replicates can be found on the following two pages.

# Photograph 51

by Anna Ziegler

## Cast

Rosalind Franklin..... Madeleine Evangelista  
Maurice Wilkins..... Bennett Cross  
James Watson..... Michael Tandy  
Francis Crick..... Todd Kremer  
Don Caspar..... Jack Janzen  
Ray Gosling..... Jeremy Segelke

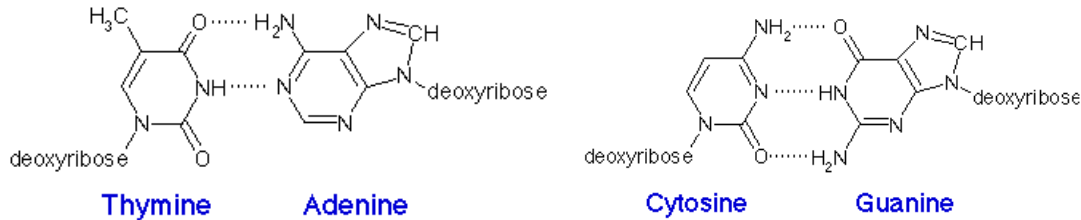
## Production Team

Director..... Elise Collins  
Scenic/Lighting/Sound/Projections/Costume Designer..... Elise Collins  
Lightboard Operator..... David Kocina  
Soundboard and Projections Operator..... Michael Chen

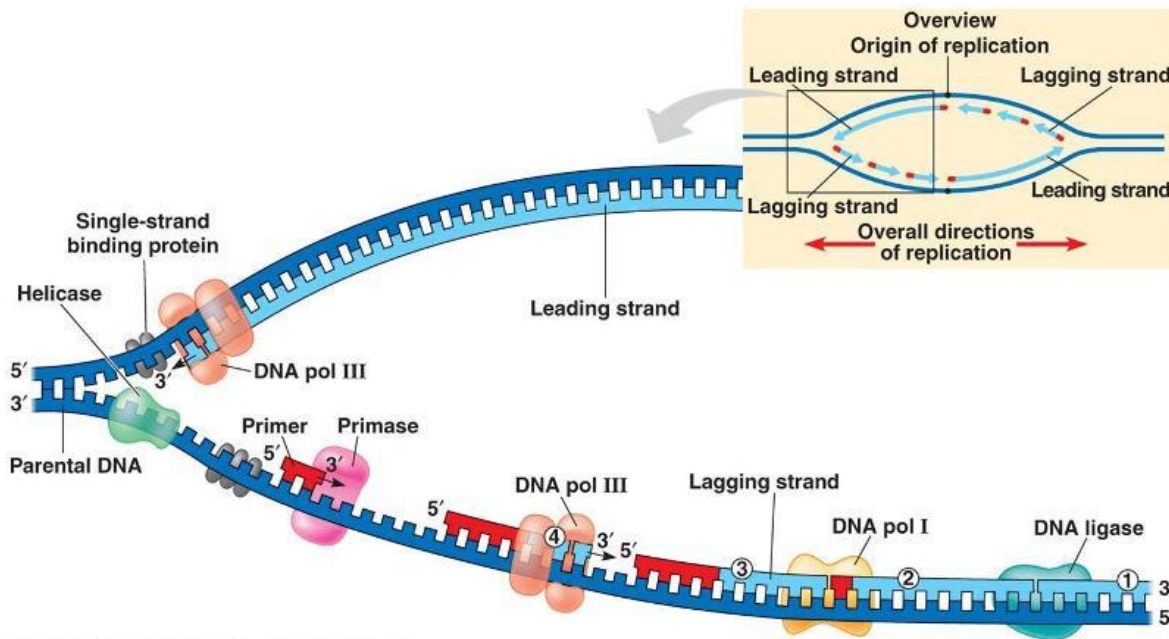
Special thanks to Reed Otto for his lighting consultation and advice, Dr. Cecilia Pang for her valuable feedback, Cathy and Stephen Collins for their loving support and assistance in acquiring props and research materials, Erika Duan for her assistance in pulling costumes from storage, and Davis Hatcher for creating the DNA model. To see more of his work (especially his awesome jewelry made of twisted wire), visit **discoverhelix.com**.

### Cool Facts About DNA:

- DNA is made of 4 bases (otherwise known as nucleotides): Adenine (A), Thymine (T), Cytosine (C), and Guanine (G). Adenine always pairs with Thymine. Cytosine always pairs with Guanine.



- DNA is a double helix (a structure that looks like a twisted ladder) made of two anti-parallel strands.



#### How DNA Replication works:

- The strands are separated by Helicase, creating a replication bubble.
- DNA Polymerase III adds nucleotides to the DNA in a 5' → 3' direction. (Notice the labels on ends of the strands in the diagram above.)
- One strand can replicate very quickly since it is 5' → 3'. This is called the leading strand. The other strand is the lagging strand and it replicates in shorter sections because it is a 3' → 5' strand.
- Primase adds small sections of RNA to the lagging strand because the DNA Polymerase III can start with these small sections and then add nucleotides in a 5' → 3' direction.
- DNA Polymerase then comes by and replaces the RNA sections with DNA. DNA ligase then connects the segments of DNA on the lagging strand.

This unzipping of the DNA strands parallels the disintegration of the relationship between Rosalind and Maurice; therefore, for the first portion of the play, I noted key moments when their relationship was negatively impacted and separated the animated strands of DNA accordingly. The strand of DNA had separated entirely by the time Rosalind and Maurice's relationship completely disintegrates. While their relationship was disintegrating, the two laboratories began progressing on their work. To represent each group's progress towards discovering the structure of DNA, I decided that the top DNA strand would represent the progress made at Cambridge University and the bottom DNA strand would represent the progress made at King's College. Nucleotides were added to each of the chains when each scientist made progress toward the discovery. Rosalind and Maurice were represented by the lagging strand because it doesn't add nucleotides as easily and the two of them didn't collaborate as easily. Since Ray frequently tries to smooth things over between the two of them and prime them for more positive interactions, his color was associated with primase and the resulting RNA fragments which prime the lagging strand for adding more nucleotides.

As the play progressed, the strand of DNA representing Cambridge University completed its replication and reached the left side of the slide. The DNA strand representing King's College almost reached the left side of the slide but stopped a few nucleotides short to symbolize how the scientists at King's College were extremely close to discovering the structure of DNA but didn't make it. One audience member approached me after the show told me how much they enjoyed that image at the end of the show. It emphasized the tragedy and the competitive nature of the 'race' as they watched the play. Unfortunately, not as many audience members understood the metaphor as I would have liked. The individuals who understood the metaphor thoroughly enjoyed it, but I had given many of them a heads up about the parallel between the characters'

actions, the costumes, and the characters. If I were to mount this production again, I would add a director's note to the program to make this metaphor more explicit to ensure that more audience members understood the parallels between the plot and the animation.

To view the animation and read about when each portion of the animation occurred in relation to the story, please see Appendix H.

### **Part Three: Concept and Design Elements**

Before I began designing the technical elements for *Photograph 51*, I read the script multiple times to discover themes and ideas that stood out. Two ideas resonated with me and inspired my designs. First, the recurring idea of shapes, especially “shapes overlapping like endless Venn diagrams” informed my stage pictures, lighting design, and scenic design (Ziegler 11). Second, the idea of depicting the interpersonal relationships of the play through an animation of a DNA replication bubble informed my projection design and my costume design.

#### **Stage Pictures**

From the beginning of the production process, I viewed the play as a series of images. The play’s emphasis on physical shape reinforced this mentality. I see blocking as a series of dynamic stage pictures creating a larger tableau which tells the story. My approach worked rather well for this production because this play is written as a series of fluid interconnecting beats. To stage the show, I utilized an exercise from my directing class where we staged a tableau and told a story through a series of images. I blocked the play by creating a series of dynamic images that displayed character relationships. These images were influenced by the interpersonal relationship theories and the Viewpoints concepts of spatial relationships, architecture, and shape (Bogart and Landau 6).

I utilized the viewpoint of spatial relationship to emphasize the integrating relationship between Rosalind and Don. Bogart and Landau define spatial relationship as “The distance between things onstage, especially (1) one body to another; (2) one body (or bodies) to a group of bodies; (3) the body to the architecture” (Bogart and Landau 11). To emphasize how Rosalind and Don were growing closer, I brought them closer together onstage with each new letter. With

the second and third letters, I encouraged the actors to find more moments when they could make eye contact with each other and thereby engage in confirming behavior.

On the other hand, as Rosalind and Maurice's relationship disintegrated, I adjusted their blocking accordingly. I utilized a combination of spatial relationship and architecture to emphasize their conflicts. Bogart and Landau define architecture as "the physical environment in which you are working and how awareness of it affects movement" (Bogart and Landau 10). When Rosalind and Maurice are arguing over how Maurice misinterpreted Rosalind's work at a conference, I placed the desk between them, so they would literally be fighting *over* their work, thereby creating a spatial metaphor. In another one of their arguments, where both of them use personal attacks against the other, I had nothing in between them because being out in the open without any set pieces to block them from the other's attacks made both of them more vulnerable.

I utilized the Viewpoints concept of shape in many of the more poetic images within the show. Bogart and Landau define shape as "the contour or outline the body (or bodies) makes in space... in one of three forms (1) the body in space; (2) the body in relationship to architecture making a shape; (3) the body in relationship to other bodies making a shape" (Bogart and Landau 9). The shape of bodies in relationship to each other influenced the following images when the men pass Rosalind's paper around her while she doesn't look up, when Don tries to mirror Rosalind's shape in an effort to understand her better, and when Maurice catches Rosalind and their bodies curve around each other like the spiral of a double helix.

A comprehensive guide to the reasoning behind various stage pictures is in Appendix I.

## Lighting and Scenic Design

### Lighting Design

I centered my lighting design around the idea of circles overlapping in endless Venn diagrams. I utilized circles of white light to unite characters in the space, separate them, and direct the audience's focus during the many scene transitions. These lights created circles on the floor and semi-circles on the slightly reflective black walls. I utilized five main circles of light: a light for the King's College table<sup>7</sup>, a light for the Cambridge University table, a center stage light, a light on far stage right, and a light on far stage left. The lights on the two tables deliberately did not intersect so I could create a clearer image of separation between characters and the two universities. The center stage circle of light overlapped with the circles of light for the tables. This design enabled me to show when characters' lives intersected and to highlight moments of narration. To see these circles, please view the lighting design section of Appendix I.

The other lights utilized were a general wash of white light, the x-ray, an aisle light, the house lights, and a final blue wash. The general wash was used to fill in the shadows on the actors' faces. Since I didn't have the budget or the time to construct a realistic-looking x-ray beam, I established the illusion of an x-ray beam through the use of a white rectangle of light that shone upon the floor. I adjusted the shutters on the light to create crisp straight lines to provide a distinct contrast from the circles and general wash. I created a similar rectangle of light to highlight Ray when he walked down the center aisle of the audience and stood at the end while holding a picture and narrating. I utilized a rectangle of light because I wanted him to be lit but

---

<sup>7</sup> I chose the strongest light in the Acting Studio to be the spotlight on the King's College table to place more emphasis on Rosalind Franklin. Originally this light was shining on the Cambridge University table. Therefore, when both tables were lit, James and Francis would steal more of the focus. I did not want to emphasize their story more than Rosalind's. Therefore, I adjusted the lights accordingly.

wanted to keep the light out of the eyes of the audience. The house lights were utilized when Rosalind and Maurice walked through the house. Since the audience was already being included in the blocking, this was the best way to light their journey without blinding the audience. These lights helped demonstrate a shift from being outside to being inside after they finished their ‘walk to work.’ At the conclusion of the play, the use of the blue wash of light helped distinguish the setting of the final scene from the rest of the story and establish a more somber mood after Rosalind dies.

The lights were all operated by David Kocina, a dedicated lighting technician. Due to the frequent scene changes, the production had over 100 light cues, each of which he adjusted by hand on the Acting Studio’s lighting board. I appreciate his assistance in helping light the play and tell the story within *Photograph 51*.

## **Scenic Design**

### Audience Placement

Since *Photograph 51* was being performed in the Acting Studio, a black box theatre, I could place my audience anywhere in the space. I chose to seat my audience on a diagonal across the middle of the Acting Studio. This decision allowed audience members to have different perspectives on the same scenes and created a large playing space with a variety of distinct areas I could use while blocking. Having seen a variety of productions in the Acting Studio, I chose this unusual design because I wanted to create something unique. Additionally, the use of depth during the Colorado Shakespeare Festival’s production of *Hamlet* fascinated me; therefore, I chose a setup that provided opportunities for utilizing the depth and width of the playing space.

This audience arrangement created many sightline difficulties. I addressed each problem as it arose by revising the blocking. The setup required a strange mixture of proscenium blocking

techniques and thrust blocking techniques. The actors had to play to the audience directly in front of them (similar to a proscenium stage) and play to the audience on extreme house left and house right (similar to how thrust stages show the action from the sides). To be seen from the front, they had to cheat out. To be seen from the sides, I staggered their stage pictures to ensure that no characters would be standing directly in front of each other. To check the audience's sightlines, I watched rehearsals from different locations in the makeshift front row, paying particular attention to the seats on far house left and far house right. This challenge quickly resolved itself once I realized that every audience member would not be able to see every actor's face at all times. Therefore, to provide every audience member with an interesting viewing experience, I adjusted my blocking to ensure that each audience member could always see at least one actor's face at all times. This meant that the audience perceived different moments from different characters' perspectives, creating a nice parallel to how each of the chorus members sees Rosalind's story from a different perspective. I like to think that if an audience member came back a second night and watched from a different place in the house, they would see a slightly different story.

Due to the large playing space, I utilized the entire space to give everyone something to watch. Therefore, I staged scenes in the center, on far stage right, on far stage left, utilized the doors as entrances and exits, and had actors walk through the aisles and around the house. I wanted even the people in the back rows to feel engaged and close to the performance.

Considering that my actors would be walking through the audience, I didn't think that risers would fit well in that configuration within the space. Therefore, I decided to seat the entire audience on the floor which made it harder to see the action if one sat further back in the house.

If I were to mount this production again, I would try to elevate the audience to provide a better viewing experience for all patrons.

### The Set

My set design centering around two tables and five chairs was based upon Giorgio Tsappas' set design for Theatre J's 2011 production of *Photograph 51* (Ziegler 7). I saw an image of this set in Ziegler's 2011 version of the script. His design had levels, two tables, and five stools scattered throughout a triangular performance space. I enjoyed the simplicity and elegance the design provided. The simplicity of my set allowed for a great deal of versatility while blocking, mainly because I could quickly move chairs throughout the space<sup>8</sup>.

The downside of the design's simplicity is that it made it more difficult to establish new locations. I established new settings through the use of projections and small hand props. However, I did receive feedback from one of my peers that the locations could have been made even clearer (see Appendix J). If I were staging the production again, I would have used more set dressing to differentiate between locations.

### Props

I chose and designed props with the intent to create verisimilitude because the stakes wouldn't be as high if the science didn't feel legitimate. With the generous assistance of the CU biology department, I borrowed a microscope from the 1950s, which helped establish both the setting and the time period. All the paper props were designed to be as accurate as possible. The x-ray photos were recreations of x-ray images taken by Rosalind Franklin and Maurice Wilkins. I printed facsimiles of the paper stolen from Rosalind Franklin and Linus Pauling's erroneous

---

<sup>8</sup> I added felt feet to the bottoms of the chair legs to allow the chairs to slide around the space without damaging the Acting Studio's floor. This modification led to faster and quieter transitions.

manuscript describing the structure of DNA as a triple-stranded helix. For the issue of the journal *Nature*, I reprinted the original cover from the edition in which James and Francis' paper was published. The DNA model was far harder to create. I enlisted the help of a local jewelry designer to make a wooden stand into which James and Francis could insert large wire replicas of DNA nucleotides. The use of removable DNA nucleotides meant that we could initially bring an incorrect version of the model onstage and then build it correctly later in the show. The only major historical inaccuracy was that our model was not nearly as large as the actual model. The x-ray crystallography camera looked far more accurate. Although I created it from an assortment of camera pieces, wire, a volt-meter, cardboard, buttons, a tin can, and an abundance of black electrical tape, it still looked realistic from the audience.

Upon the suggestion of Dr. Cecilia Pang, my directing professor and Studio 5 advisor, I created additional set dressing to fill a vacant space upstage and make the space feel more like a laboratory. To do this, I utilized a piano that was already in the Acting Studio as a makeshift shelf by covering it with a black tablecloth. I placed a variety of scientific objects upon it, including, but not limited to molecule models, microscopes, books about Rosalind Franklin, and books written by James Watson. Images of the set dressing and the rationale behind its placement are in the scenic design section within Appendix I.

### Sound Design

I have included sound design within the category of scenic design because it played an important role in establishing the time period of the piece. Since there were no sound cues during the middle of the show, the only sounds utilized were songs that played before and after the show. During the pre-show, all the music was from the 1950s to help establish the time period. I chose upbeat songs so the music would not foreshadow events later in the play, especially

because Maurice wouldn't believe that the somber ending to Rosalind's story is set in stone. The music choice was more somber during the curtain call but gradually became more upbeat as the audience started to exit the theatre. While the mood created by the music selection varied, all the lyrics to the songs carried deeper messages which paralleled interpersonal relationships and themes within the play. Descriptions of each song's significance are in Appendix G.

## **Projections and Costuming**

### **Projections**

The production's projections emphasized moments of imagery, established locations, and created the parallel between a DNA replication bubble and the characters' relationships through the use of animation. I created all of the projections and developed 41 slides with extensive animations. Animations were utilized to emphasize the idea of shapes in Rosalind's opening monologue and the moment when Ray puts his hand into the x-ray beam. Projections of the Swiss Alps and the Cambridge countryside established when the action was occurring in a location other than the two main laboratories. Finally, the animation of the DNA replication bubble provided a moment by moment visual representation of Rosalind and Maurice's relationship disintegration and the progress each lab had made towards discovering the structure of DNA. For more details on the DNA replication bubble metaphor, please reference the "DNA Replication Metaphor" section earlier in the paper. For more information on when the projection slides transitioned or when the DNA animation changed, please see Appendix H.

### **Costuming**

To supplement the DNA replication bubble metaphor, each character had a specific color that correlated to their character's representation within the projections. The characters' color representations were as follows: Rosalind's color was green to match her skirt and her down to

earth personality; Maurice's color was black to match his jacket and his regret; James' color was red to match his tie and his abrasiveness; Francis' color was orange to match his tie and his connection with James; Don's color was purple to match his shirt and his calm demeanor; and Ray's color was bright blue to match his shirt, his tie, and his vibrant personality. Their colors would remain consistent throughout the entire production because each character had a single costume for the whole performance. It became easier for the audience to draw a connection between how the actions of each character and the changes in the animation because the color of each character's costume corresponded with the color that represented them in the animation.

To ensure that the costumes were relatively historically accurate, I created a Pinterest board with images of each of the characters' historical counterparts. In the majority of the pictures, the men were wearing slacks, collared shirts, ties, and the occasional suit coat. I pulled a couple of costumes from CU Boulder's costume storage stock, such as a shirt, a pair of pants, two coats, and Rosalind's entire costume. I wanted to make Rosalind look fashionable because Rosalind Franklin was a very stylish woman in real life. However, her costume also had to have the potential to be perceived as 'dowdy' during the scene where James comments, "she could possibly be attractive if she took even the mildest interest in her clothes" and "I wonder how she would look if she took off her glasses and did something novel with her hair" (Ziegler 32).

Most actors wore their own clothing. This ensured that all the clothes fit and made acquiring the majority of the costumes much easier. The clothing available to each actor influenced the final color choices. The actors' access to more contemporary wardrobes meant that the men's pants and shirts didn't correlate precisely to the styles of the 1950s, but the final results were quite similar to the aesthetic of the inspiration images.

## **Part Four: The Directing Process**

In the following section, I analyze my directing process through the lenses of relationship integration theory, conflict management styles, supportive and defensive communication, and confirming and disconfirming behaviors.

### **How Relationship Integration Informed Ensemble Building**

Building a strong ensemble is integral to having a productive rehearsal process, keeping the members of the ensemble happy, and creating a great show. Therefore, I intentionally utilized check-ins, frequent actor feedback, and structured warm-ups to build connection within the ensemble. These techniques were effective because they fulfilled the five steps of the relationship integration model created by Knapp and Vangelisti.

The entire ensemble, cast and crew (once they were added to the production process), participated in a check-in at the beginning of each rehearsal. Checking in entailed describing how you were and how your day was going in two to three sentences. After each individual finished describing their day, they would say “I’m checked in” to let the other ensemble members know that they had finished, thereby preventing potential interruptions. This daily check-in helped the ensemble see each other as complex human beings. Deliberately checking in each day showed that I cared about each of their lives. This proved to be a helpful tool as well. If an actor was having a bad day, in rehearsal they might respond negatively or with less enthusiasm than usual. Reminding myself that my ensemble<sup>9</sup> had complex lives outside of the show helped me be more understanding and patient during rehearsals.

---

<sup>9</sup> I am deliberately using the term “ensemble” instead of “cast,” because the technicians are an important part of a production. In my previous experience as a technician, I noticed a common divide between the actors and the technicians. My goal was to create a single ensemble, therefore I made sure to include the technicians in the check-ins and the pre-show circle. Apparently, this process was effective, because at the post-mortem, David, the lighting technician, stated, “This

I utilized frequent actor feedback throughout the rehearsal process. After I gave a direction, we would see if the blocking or revision worked when put on its feet. I would then check in with the actors to see if anything felt unnatural<sup>10</sup>. By openly soliciting their feedback and encouraging their ideas, I enabled the actors to feel more confident in their choices. This kind of feedback minimized the power divide between the actors and myself. Instead of me solving problems for them, we would problem solve together. I liked to approach blocking challenges with the following mentality: “I don’t have all the answers and you don’t have all the answers, but we can find an answer together.”

Warm-ups brought the ensemble together and created a sense of unity before each show. I would always warm up with the cast. If I asked them to do something ridiculous, such as saying tongue twisters<sup>11</sup> with a pen between their teeth to improve enunciation, I would do it with them. I wanted to establish clearly that I would not ask them to do anything I would not be willing to do myself. Our last warm-up was always Zip-Zap-Zop, a game where energy was passed quickly around a circle. This exercise required all of the actors to work together, because if a person lost focus, the game would end. Zip-Zap-Zop increased everyone’s energy, improved focus, and reminded each actor that their contribution was an important part of making the show run smoothly. Finally, the entire ensemble (including the technicians) would join in a ritual for good luck.

---

was the best show I’ve had working tech with actors... I didn’t feel separate or different because I was doing tech. I didn’t feel ostracized. It felt like a company” (Kocina).

<sup>10</sup> Every time we tried something new in rehearsal, I would remind them that “if we don’t like it, we can throw it out the window and try something new.” In retrospect, this statement creates an attitude of provisionalism, a method that Gibb suggests can counteract certain communication (DeVito 254). This created an atmosphere of experimentation and encouraged the actors to make new discoveries even through opening night.

<sup>11</sup> In addition to normal tongue twisters, we would say scientific words specific to the show, such as: deoxyribose nucleic acid, monomeric nucleotide, adenine, thymine, cytosine, and guanine. They’re quite difficult to say five times fast!

These techniques led the ensemble to follow Knapp and Vangelisti's model of relationship integration: initiating, experimenting, intensifying, integrating, and bonding. Check-ins helped us meet each other, thereby fulfilling the initiating stage. They allowed us to get to know one another's lives on a deeper level, thereby fulfilling the experimenting and intensifying stages. By maintaining open communication throughout the rehearsal process, I made sure that the final product was not merely *my* creation – it was *our* creation, progressing the relationship into the integrating stage. The warm-ups and the pre-show circle additionally reminded the entire ensemble that the production was *theirs*, thereby maintaining the relationships after having achieved relationship integration.

### **How I Dealt with Conflict**

The rehearsal process engages a director on multiple levels. They must facilitate the building of relationships between characters and the building of relationships between themselves and the ensemble. In my directing process, the theory of conflict management frequently applies to my interactions with the ensemble. Since conflict management is frequently conflict specific, I shall describe my conflict management style by describing how I approached the following conflicts during the rehearsal process: actors being underprepared and tension between one actor and myself.

#### Underprepared Actors

When the actors were supposed to be memorized, three of my actors were quite prepared and the other three were underprepared. Two days after the off-book deadline, one of my actors approached me after rehearsal. While I was working on a scene with the three underprepared actors, this individual spoke with the other more prepared actors. They wanted to let me know that they were feeling frustrated with the other actors' lack of preparation and wanted to express

their desire for me to crack down on the other actors to learn their lines. As a director, I wanted to create a supportive environment in which it was ok for actors to make mistakes, as this is a critical element that enables actors to make bold choices onstage. As a human being, I strongly believe that one should never try to shame someone in order to change them. Instead I believe that opportunities for an individual to save face and create change on their own lead to the most positive outcomes. Therefore, the idea of ‘cracking down’ on the other actors’ memorization felt daunting to me. I could pull the three actors aside and speak to them about their professionalism and preparedness, potentially embarrassing the three of them and widening this divide within the ensemble, encouraging the cast to differentiate between *us* and *them*. I could call the underprepared actors out on their poor memorization in front of the entire cast. This decision would satisfy the prepared actors’ desire for action to be taken and might lead to a faster change in the behavior of the underprepared actors. However, making this decision would directly conflict with my values and leadership style. In the end, I decided on a different approach. The following rehearsal I took extensive line notes, writing down every time a word or line was missed, if anything was paraphrased, or when someone called for line. Once the run of the show had finished, I sat in the middle of the rehearsal space and divided up the line notes by actor. When handing the notes out to the actors, some stacks were much larger than others, but no actor was completely word-perfect. To me this was the ideal solution because the actors who came to rehearsal unprepared could physically see how much work they had to do, what specifically needed to be resolved, and were held accountable by their own mistakes. The actors who believed that they were more prepared than everyone else could feel that the issue had been addressed and could no longer perceive themselves as better than the other actors because even

they were not word-perfect. In allowing each individual's work to hold them accountable, I provided each actor the opportunity to save face and resolve their own mistakes individually.<sup>12</sup>

In this instance, I initially avoided the problem of addressing the three actors' lack of memorization in the hope that they would memorize their lines with a day or two of the off-book deadline. When the problem continued and the other actors approached me, I used a compromising conflict management style. While I did not directly speak with the three underprepared actors as the other actors were probably anticipating, I compromised when I gave out extensive line notes, thereby mixing their expectations with my values as a leader.

#### Tensions with an Actor

During the second and third weeks of rehearsal, I felt increasing tension between an actor and myself. On the second day of rehearsal when I was asking actors about how they worked best, he sounded frustrated and gave me a long list of how he *didn't* want to work. He then expressed that he didn't think that my directing style would mesh well with his process as an actor. Knowing his expectation, I tried to modify my direction slightly when I blocked his scenes. Although I like thorough planning while blocking, he preferred to experiment and improvise more in rehearsals, consequently I would give him general guidelines of where to be on a particular line and then let him experiment. If I saw a decision I liked, I would tell him to keep it.

As rehearsals progressed, I became increasingly frustrated by how he would distract other actors, question my direction, and be unfocused in rehearsals. His attitude sometimes would indicate that he didn't want to be there. As tension between us increased, I decided to 'choose

---

<sup>12</sup> In an effort to maintain academic integrity, I utilized this portion of my analysis in my Leadership Capstone course. I included it here because it concisely and thoroughly described the challenge and my thought process for addressing it.

my battles' carefully and only address moments that really bothered me. I expected to continue in this manner until the show closed, yet he asked to speak to me outside of rehearsal. He had perceived the growing tension between us and wanted to directly speak about it. We discussed what was bothering each of us around the rehearsal process. By talking through these subjects, we could understand the other's perspective and adjust how we proceeded accordingly. This conversation resolved the tension and led to much smoother rehearsals.

Until our conversation, I hadn't realized that I might be avoiding this conflict. I believed that I was compromising by trying to choose potential conflicts carefully and addressing those conflicts in a measured manner. This conflict helped me discover that I prefer directly addressing conflict through straightforward conversations with others because this led to a greater understanding of both parties' perspectives and improved our future collaboration.

### **How I Avoided Defensive Communication Styles While Directing**

While directing *Photograph 51*, I noticed many opportunities when I could have used communication styles that might make my actors respond in a defensive manner, as described in Gibb's communication theory. Within this position of power, I could have easily utilized evaluative, controlling, and superior communication. I worked hard to avoid using these communication styles. As a director, I have to evaluate the actors' work in order to refine it for the final performance. When I gave feedback, I would frequently phrase my notes as descriptive statements – noting what I saw, telling them what I wanted, and then discussing how to reach my final vision with the actor. Since I was in a position to give people commands, I had the potential to use controlling communication quite frequently. To counteract the potential negative effects of this style of communication, I made sure to encourage actors to share their ideas and frequently expressed how much I appreciated their contributions to the production. Because I determined

the overall vision of the production, I could have easily fallen into communication that falsely portrayed me as superior. To prevent the creation of a ‘superior’ persona and make my actors feel inferior or ‘less-than,’ I admitted when I didn’t know something and owned up to my faults. By using my knowledge about the styles of communication that can lead to defensive behavior, I managed to create a more supportive environment and better working relationships with my actors.

### **How Confirming Behaviors Positively Influenced My Directing**

Since the blocking of *Photograph 51* frequently focused on disconfirming behaviors, I was very aware of utilizing confirming behaviors while interacting with my actors. I intentionally utilized confirming behaviors to create a supportive learning environment where actors felt valued as they were being coached.

I wanted to create a supportive learning environment to benefit my actors and me because this is a college production. I approached this process from the perspective of a teaching artist. This mentality is now inherently tied to my style of directing because the majority of my directing experience comes from assistant directing shows with Camp Shakespeare, an educational theatre camp run by the Colorado Shakespeare Festival. Instead of only focusing on creating blocking and the overarching concept, the perspective of a teaching artist reminds me that I have an incredible opportunity to help my actors learn. I intentionally asked my actors how they were hoping to grow throughout the production process. By discussing the actors’ goals, I could help tailor the experience to fit their needs and find the appropriate tools and exercises to help them reach those goals. For example, if someone wanted to ‘get out of their head’ and make more physically motivated choices, I would give them movement exercises and see if they liked any discoveries they made.

To ensure that my directing style was contributing to this supportive learning environment, I utilized the confirming behaviors by actively listening, giving ensemble members my complete attention, making eye contact, and having two-sided dialogue. When giving direction or notes, I would make sure to confirm that my ensemble members knew what I was saying by checking in with them or repeating an idea they told me to ensure that I understood them correctly. I made sure to get up within the space and engage with them by giving notes from the audience and even on the stage with the actors. In previous productions, I have worked with directors that felt distant. I chose to work with my actors in a relatively close space to help them know that I wanted to be present with them and that I was just as invested in their process as they were. I made sure to give the ensemble members my complete attention by keeping my phone off during my rehearsals and focusing entirely on them. I would do this by making eye contact with the person I was addressing.<sup>13</sup> Finally, I ensured that we had two-sided dialogue where I valued their opinions and asked them to express themselves frequently.

---

<sup>13</sup> The only time I would usually break eye contact with my actors was when I was trying to revise a blocking image and I would look down at the floor to create the picture in my mind's eye first.

### Part Five: Conclusion

I staged, designed, directed, and produced *Photograph 51* through the lens of interpersonal relationship theories. My staging depicted images of connection and disconnection, power dynamics, and how characters approached conflict. My designs emphasized scientific accuracy and poetic metaphors about how images overlap. In my production process, I tried to benefit from my knowledge of the relationship theories by valuing the integration of relationships, applying collaborative conflict management techniques, avoiding defensive communication styles, and using confirming behaviors.

Analyzing the structure of the play, the given circumstances, the characters, and the language helped me realize which interpersonal interactions I should highlight throughout the story. Determining the given circumstances established the conflicts and conditions that would influence the characters. Understanding the overarching structure of the story and the turning points within the arcs of individual characters helped me to comprehend which moments of interpersonal interaction were most important for shaping the characters and their relationships. This understanding enabled me to use the blocking to highlight these moments with strong images or acting choices motivated by the interpersonal relationship theories. Learning the objectives, obstacles, and development of each of the characters helped me to determine how they would respond to different situations and create interactions that were true to each character. Understanding the essence of each character helped me realize what I was looking for in my actors. When I analyzed the text of the play through relationship theories, I readily saw how power shifted throughout the play and the extent to which different characters respected each other, which I then reflected through my blocking. The play's text and stage directions helped me

determine where I could apply the concepts from specific communication theories to the final production.

Knapp and Vangelisti's theory of relationship integration and disintegration helped explain why the interactions between Rosalind and Don, James and Francis, and Rosalind and Maurice all ended so differently. This theory justified the arcs of their relationships and helped me find moments I should emphasize within their interactions. Knowing the conflict management styles enabled me to create motivated and dynamic interactions between characters. Gibb's theory of supportive and defensive behaviors helped explain why so many conflicts went poorly within the play and which moments would escalate the conflict by making characters defensive. Evelyn Sieburg's theory of confirming and disconfirming behaviors enabled me to create more dynamic images while blocking, show how much characters valued each other, and justify why relationships were integrating or disintegrating. The knowledge of these theories helped support my DNA replication bubble metaphor, an animated representation of how the characters' relationships changed as the play progressed.

The theories affected my blocking and design as I translated the academic concepts into concrete design and staging choices. I used spatial relationships, architecture, and shape to create physical manifestations of the state of the characters' relationships. My lighting design united and separated characters at significant moments of relationship integration or disintegration. The versatility of the set made it easy to change locales and create dynamic stage pictures that illustrated characters' relationships. The design additionally enabled me to create stage pictures that would show different parts of the audience different perspectives on characters' interactions. Realistic props helped to establish the high stakes of potential scientific discovery that motivated the characters' conflicts. The sound design helped bring the audience into the setting and

foreshadowed multiple relationships within the play. Projections and costuming were used to create the DNA replication bubble metaphor that visually represented the progression of characters' relationships.

Interpersonal communication theories also influenced the interpersonal relationships within the ensemble. We created a close and cohesive group through the stages of relationship integration. Knowledge of conflict theory helped me understand how I could best tackle challenges that arose with my actors. Reflecting on this experience through the communication theories helped me learn how I can deal with conflict better in the future. Avoiding defensive communication styles created a healthier environment where my actors felt safe experimenting and making bold choices. Using confirming behaviors helped my actors feel more valued and created a supportive learning environment and close-knit ensemble.

Communication theory and theatre are natural partners. Communication theory studies life. Theatre recreates life onstage. Performing artists should consider using all of the tools at their disposal, including communication theories, to recreate life as effectively as possible. Similar to how Don Caspar states that "the shape of something suggest[s] the most detailed analysis of its inner workings," understanding the detailed inner workings of interpersonal relationships can help theatre artists recreate the appearance of those relationships onstage (Ziegler 31). These theories can help actors and directors establish each character's overall development and create dynamic stage pictures that reflect patterns of human behavior. Using communication theory in the theatre offers a fruitful way to understand characters, motivate directing choices, develop dynamic blocking, and create happy, healthy ensembles. Combining the disciplines of the behavioral sciences and theatre holds promise for other directors in the future. By analyzing the structure of interpersonal relationships in the play, in the design elements, and in my directing

process by using Knapp and Vangelisti's model of relationship integration and disintegration, Thomas and Kilmann's five types of conflict management, Gibb's model of supportive and defensive behaviors, and Sieburg's theory of confirming and disconfirming behaviors, I enhanced the clarity of the story that my production told and improved the ensemble's experience throughout the production process. Theories from other behavioral sciences including anthropology, psychology, and sociology also likely would have a positive impact on my directing and help other directors.

Looking back on this project, I see the entire production as a series of overlapping concepts. Just as shapes overlapped for Rosalind, the theories I used overlapped with my work and influenced the whole production process. The interpersonal communication theories overlapped with my directing techniques. My directing techniques overlapped to create dynamic blocking images. Images overlapped to create scenes. Scenes overlapped to create a play. Individuals' lives overlapped to create an ensemble. This is the heart of a production – a group of individuals whose lives overlap over a short period of time and space creating the beautiful and ephemeral art we call theatre.

## Appendixes:

### Appendix A: Production Proposal

#### **Director/Choreographer Application & Production Approach/Concept Proposal**

University of Colorado Boulder Department of Theatre & Dance

**Applicant Name:** Elise Collins

Play/ Show: *Photograph 51*

Author Name: Anna Ziegler

Desired Adaptation: 978-0-8222-2508-9

#### **Approach/ Concept:**

*Please describe the particular approach/conceptual direction you are considering for this production?*

I would like to examine the relationships of the play as individuals and teams come together and separate similar to how anti-parallel strands of DNA join and separate within a DNA replication bubble. I will reveal this through the use of projections of an animation of DNA that corresponds with the characters and their various interactions. I will additionally emphasize the forces that bring characters together and separate them through the use of stage pictures and overlapping circles of light, the use of “shapes overlapping, like endless Venn diagrams” (Ziegler 11).

*How might this Approach/Concept impact its feasibility/expense/scope-of-production?*

This approach might impact the feasibility of the production, because it will take time and effort to coordinate the animation and the projections to match the storyline and it will require setting up a projector.

#### **Cast/Ensemble:**

*Would you consider Gender-Neutral Casting? If so, which characters?*

I would not consider Gender-Neutral Casting, as the gender of the characters leads to conflict and the ostracizing of Rosalind Franklin.

#### **Production Information: (Based on present thoughts)**

Period and/or Style of Production:

1951-1953

#### **Basic Costume Requirements:**

- Five collared shirts
- Five sets of pants
- Lab coats?<sup>14</sup>
- One shirt and skirt (color may correspond with the animation piece representing her)

---

<sup>14</sup> The lab coats were cut as they did not add enough to the verisimilitude of the production to justify the logistical hassle of getting them on and offstage.

- Coat for Rosalind while traveling
- One set of pearls
- Five different colored ties (colors may correspond with the animation piece representing them)<sup>15</sup>

### **Number of Costumes:**

Six costumes – one for each character. Lab coats and a coat will be put over each character's base costume.

### **Special Costume/Hair/Make-Up Needs/Demands. Please Describe:**

Depending on who is cast, we will try to emulate the hairstyles the real scientists wore in the 1950s. If the individuals cast have enough hair to do those hairstyles, I will be glad to do them myself.

### **Basic Scenic Requirements:**

- Two tables or tall acting blocks to represent lab benches
- Five stools<sup>16</sup>

### **Special Scenery/Set Dressing Needs/Demands. Please Describe:**

Something resembling an 'x-ray diffraction camera' and a microscope (I will try to ask the science departments if they have any old equipment in storage.)

### **Basic Property/Furniture Requirements:**

A letter, pencils, lab ray, 2 DNA vials, 2 fluid vials with droppers, 5 petri dishes, folio, *microscope*, *box of microscope slides*, notepad, DNA research notebooks, blank X-ray files, *X-ray diffraction camera*, *rotary dial telephone*, briefcase, folder of DNA photographs, photographs of DNA (including Photograph 51), lab toolbox, slide rule, protractor, compass, ruler, triangle, box of chocolates, 3 'pints of beer', *incorrect DNA model*, Pauling's manuscript, copy of Photograph 51, newspaper, cup of tea, 2 glasses of 'whiskey', *DNA model (partially constructed)*, *DNA model (completed)*, sketch on newspaper, Folder of B strand research, *issue of Nature magazine*, tablecloth, flowers (?)<sup>17</sup>

### **Special Prop/Furniture Needs/Demands. Please Describe:**

The more difficult prop/furniture demands are above in italics.

### **Basic Lighting Needs:**

- four 'circles' of light of the same color (with crisp edges if possible)

---

<sup>15</sup> For the men's costumes, their color that represented them within the projected animation could correspond with their ties, their shirts, or both.

<sup>16</sup> Chairs with sliders on the feet were utilized for the final production.

<sup>17</sup> The initial props list came directly from the appendix of Anna Ziegler's script. Throughout the production process, I realized that we only needed a fraction of these props. Props that were not created for the final production were: the letter, a second DNA vial, two fluid vials with droppers, five petri dishes, a box of microscope slides, blank X-ray files, a slide rule, a protractor, a compass, a ruler and a triangle.

- a wash of a different color to differentiate the in-between chorus space<sup>18</sup>
- a projector that can project on the wall<sup>19</sup>

**Special Lighting/Effects Needs/Demands. Please Describe:**

- one light to represent the x-ray (with a different color gel and crisp edges; square if possible)

**Basic Sound Needs:**

All I need is a small boom-box or speaker to play cues from my computer<sup>20</sup> since I already have QLab downloaded.

**Special Sound Needs/Demands. Please Describe:**

Not applicable.

**Staffing Needs/Demands Beyond Normal Design/Production Personnel. Please Describe: (Including Movement Specialist, Fight Choreographer, Vocal Specialist, Etc.)**

The only possible outside production personnel that would be helpful would be a dialect coach to help the actors playing Rosalind, Maurice, Ray, and Francis with their British accents. This role may not be necessary if the actors already know British accents or if they can learn from Paul Meier dialect CDs.<sup>21</sup>

**Do you plan to obtain outside Grants/Funding? If so, please describe:**

At the moment, I do not plan to obtain outside grants/funding, as I see the small budget as a pleasant challenge.

**Please provide any other pertinent information that the Season Planning Committee should know to properly and adequately consider your proposal: (Including Nudity, Puppetry, Animals, etc.)**

There will be no nudity, puppetry, or animals.

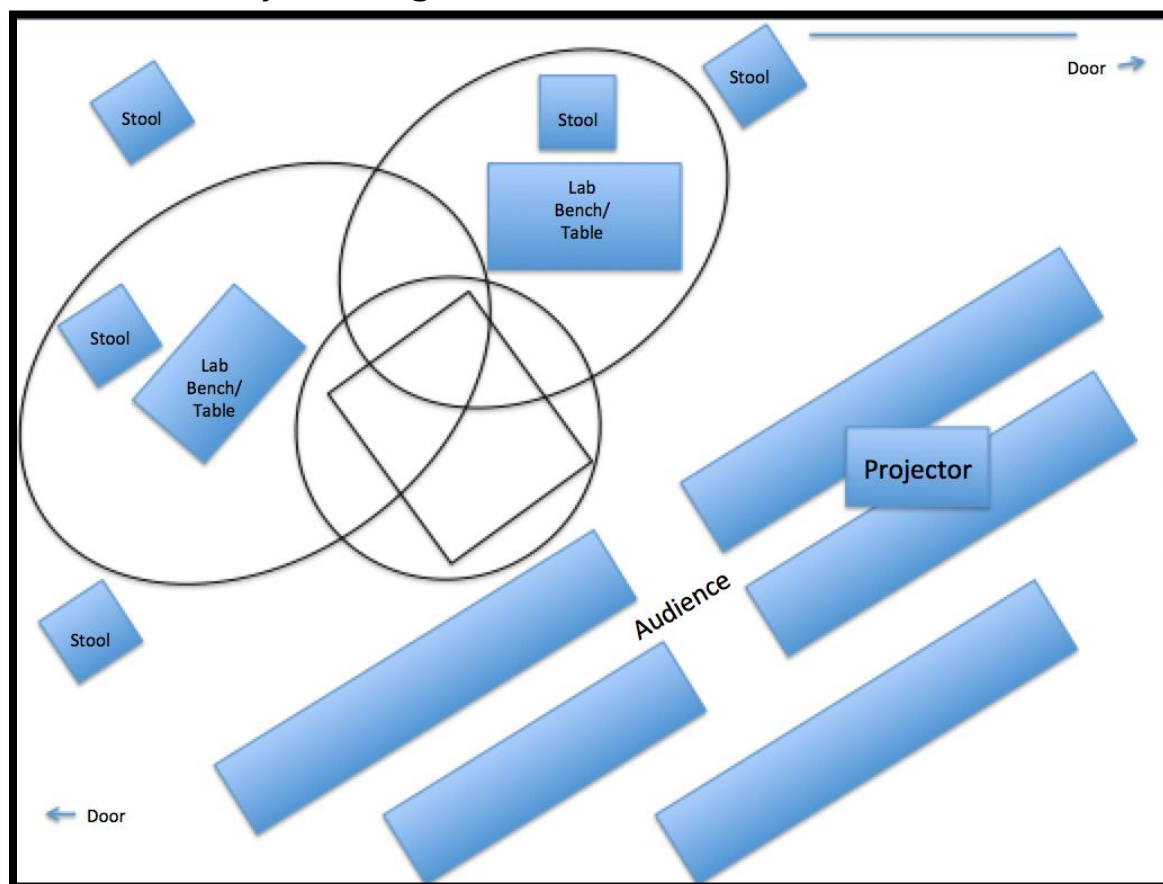
---

<sup>18</sup> Due to the frequent and rapid changes in and out of the chorus world, I determined that such a transition would be too jarring and only utilized this lighting effect to emphasize the final scene.

<sup>19</sup> The CU Theatre Department generously allowed the production the use of their projection screen which made the images much clearer.

<sup>20</sup> The pre-show and post-show music was played from a cell phone through the Acting Studio's existing sound system because the computer was being utilized for the projections.

<sup>21</sup> Paul Meier dialect CDs were utilized in lieu of a dialect coach.

**How the room may be arranged:**

Objects in blue are solid and outlines are potential circles of light (excluding the general chorus wash)

Appendix B: Production Schedule

October 31<sup>st</sup>, 2016: Proposal

January 30<sup>th</sup>, 2017: Approval of Proposal

Summer 2017: Research, Play Analysis, and Creation of Design Concepts

August 26<sup>th</sup>, 2017: Auditions and Callbacks

August 27<sup>th</sup>, 2017: Casting

September 11<sup>th</sup> – October 10<sup>th</sup>, 2017: Rehearsals

October 7<sup>th</sup> – 8<sup>th</sup>, 2017: Addition of Technical Elements (a.k.a. “Tech Weekend”)

October 11<sup>th</sup> – 16<sup>th</sup>, 2017: Performances

October 16<sup>th</sup>, 2017: Strike

October 20<sup>th</sup>, 2017: Post Mortem

Appendix C: Daily Call Example

Dearest Actors,

Today we will finish working the last scene of the show and then do a full run. I will be giving everyone line notes. There can be no calling for line after Friday, so please keep working on your lines. (You have had over four weeks to learn them at this point.) I look forward to seeing the entire thing on its feet!

- Elise

*CU Theatre and Dance*

\*Daily Rehearsal Schedule\*

**\*\*CALL TIMES ARE SUBJECT TO CHANGE\*\***

**PRODUCTION:** Photograph 51

**DATE:** Thursday 9.28.17

**DIRECTOR CONTACT:** Elise Collins –

**NOTES:**

- Tomorrow, please bring in any potential costume pieces that you have (slacks, dress shirts, shoes, etc.). This will help give me a better idea of what we still need for costumes.

**Rehearsal:**

**Acting Studio**

**6:30 pm - 10:30 pm: Scene Work:**

\_\_\_ B. Cross \_\_\_ M. Evangelista \_\_\_ J. Janzen \_\_\_ T. Kremer \_\_\_ J. Segelke \_\_\_ M. Tandy

**10:30 pm: End of Day**

Elise Collins

## Appendix D: Rehearsal Journal

In the following section, I describe what I worked on during rehearsals through a rehearsal journal. The first three days are differentiated separately, as their structure differs dramatically from the rest of the rehearsal process.

### Rehearsal Journal:

#### First Day of Rehearsal: September 11, 2017

We began rehearsals with introductions and a “check-in” – an exercise where every ensemble member states how they are doing and/or how their day is going in two to three sentences. After discussing my structure for running rehearsals, described in greater detail earlier in this paper, we read through the entire play. I was amazed at how much of the script sounded like what I had imagined in my mind. Then, to mirror other professional rehearsal processes that I had experienced, I gave a presentation informing them about the design elements they would be working with in the show. It was quite easy for me to give a comprehensive overview of all the design elements and how they connected to themes within the show because I was the Lighting Designer, the Scenic Designer, the Projections Designer, and the Costume Designer. I wanted to explain my designs and how they connected with my overarching metaphor (see “DNA Replication Bubble Metaphor on page 35) and the interpersonal relationship theories. I wanted to start the discussion about the different relationship theories early in the rehearsal process.

After the design presentation, I gave a brief dramaturgical presentation. To benefit our collaboration, I wanted to ensure that the ensemble had all the information they might need for creating their characters. To provide the ensemble with the historical context of the play, I showed them the NOVA documentary about Rosalind Franklin that I watched as a child. We immediately noticed direct parallels in the structure and uncanny similarities of phrasing in the

documentary and Anna Ziegler's script (Glassman). The similarities between structure and content of the documentary and the play strongly suggest that Anna Ziegler utilized this documentary in her research.

### Second Day of Rehearsal: September 12, 2017

I met with each of my actors individually for 40 minutes to understand their acting processes. After checking in, we discussed how they work best, especially focusing on how they memorize, how they approach character development, and how they prefer to receive feedback. Addressing these elements allowed me to get to know each actor better and start the experimenting phase of relationship integration. I chose to begin each session in this manner due to the influence of two of my favorite directors, Carolyn Howarth and Wendy Franz. When I interviewed Carolyn Howarth, about her directing process, she stated that "Part of directing is psychological. You must give direction differently to different people. You usually learn how to do this through trial and error" (Howarth). During Wendy Franz's production of *Equivocation* by Bill Cain, she started her rehearsal process by asking the actors how each of us worked best. Asking this question demonstrated her interest in her actors as individuals and her drive to run a productive rehearsal. She didn't beat around the bush to figure out each actor's style. By asking everyone directly on the first day of rehearsals, she saved herself a great deal of time and energy. Both *Photograph 51* and *Equivocation* have a cast of six people, thus making a personalized approach towards each actor far more feasible than in a larger production. Since this is a university production and should be a learning experience for the entire ensemble, we discussed areas in which they wanted to grow as performers and any acting methods that worked well for them in the past. Showing an interest in each individual's growth and development indicated that I valued them as people, not just as actors. We then delved into discussing their character. I used

this time to answer any questions they had about the story and their character. We then talked about their character's essence and broke down their character arc by discussing where the character started, where they ended, and their journey between the two points. The previous day, I asked the cast to take a Meyers-Briggs personality test as their character because it can be a useful technique for thinking about a character complexly and understanding how the character may deal with conflict.

### Third Day of Rehearsal: September 13, 2017

I began this rehearsal with a movement exercise to help the actors understand how their character moves. I wanted to encourage the actors to experiment before finally choosing one way of moving. Utilizing an exercise I previously taught during my time as a teaching assistant at Camp Shakespeare, I encouraged the actors to lead with different parts of their bodies and try moving at different tempos. I chose this exercise to try to create differentiation among the characters. In retrospect, I'm not sure how many of the initial choices stuck, but it did help establish an environment in which it was safe to experiment, fail, and make bold choices.

During the second part of the rehearsal, we created tableaux and images for the entire play. The tableau exercise gave me the opportunity to see how the actors saw their characters' relationships physicalized. I encouraged actors to use their spatial relationships and the shapes of their bodies to tell the story. While few of these images were used in the actual blocking, the exercise was informative. This exercise helped to show the actors the arc of the play and how the characters' interpersonal relationships changed over the course of the play.

Since the script reads like a single continuous scene, I took the time to break the play into separate sections or 'beats' for easier blocking. A new beat occurred every time there was a distinct shift in the script, whether a transition to a large scene or a short chorus moment.

Thinking that the movement and tableau exercises would take longer than they did, I had only four beats prepared for the blocking portion of the rehearsal. I had hoped to have more prepared for my actors by this time, yet I had not adequately prepared. After blocking the first four beats and coming to a mental roadblock on beat five, I told my actors “I am sorry I am not adequately prepared for this rehearsal. I will not keep you here and waste your time. You are dismissed from rehearsal for the evening. I will come far better prepared tomorrow.” I felt an immense amount of shame and inadequacy for my failure. It was difficult to show vulnerability in this moment. However, I am still glad that I was honest and straightforward with my actors, because it was important to me to value their time and use it effectively. The next day, I blocked a quarter of the show and came adequately prepared to every rehearsal afterward.

#### Week One: September 11-17, 2017

While rehearsing for *Photograph 51*, I based my blocking process upon the rehearsal style of director Wendy Franz. She blocks the entire show quickly over the course of a couple of days. To move this efficiently, she has actors read the scenes and then gives them places to be by particular lines. This blocking technique allows the actors to feel motivated and justified in their movement choices. I blocked the first half of the show on Thursday and Friday. The first day I called the entire cast because I was not sure how long blocking might take. After the first day of blocking, I understood approximately how long blocking each beat took. With this knowledge, I allotted specific times to show the actors that I valued their time and to block each beat to keep the process moving efficiently.

#### Week Two: September 18-24, 2017

This week, I blocked the remaining half of the show. Since I was having trouble creating blocking for beat five, I blocked the rest of the show and completed beat five last. Blocking beat

five later in the rehearsal process allowed me to move on from a roadblock, gave me time to mull over possible solutions in my mind, and rebuild my confidence about my ability to stage scenes. The blocking process proceeded as follows: we would read the beat, then block the beat, then put the beat up on its feet. After we concluded blocking on Tuesday, we commenced in-depth work on each of the scenes. I incorporated table work at the beginning of each in-depth scene rehearsal, because, as an actor, I had observed how table work could be integral to creating a dynamic scene. We would read the scene, discuss the actors' motivation and objectives, and answer any questions that arose. Then we would put the scenes on their feet and polish specific moments by tweaking the blocking. I would continually check-in with the actors to see if they felt their movement was motivated. If it felt wrong or unnatural, we would scrap it, because I placed great trust in my actors' instincts.

To view relationship arcs and characters' journeys within the show, we worked the scenes out of order in specific groupings by character. Rehearsing the scenes in this manner helped utilize the actors' time well and allowed us to evaluate the characters' relationships as they integrated and disintegrated. On Tuesday, we rehearsed the majority of scenes involving Don and Ray. On Wednesday, we ran all Rosalind and Maurice scenes in chronological order to observe how their relationship changes. On Thursday we worked all James and Francis scenes. These scenes were run out of order to accommodate other actors' schedules which hindered the process of observing James and Francis' relationship arc. On Friday we focused on the remaining beats that needed work. On Saturday, we completed our first run of the show and worked on smoothing transitions. Some of my actors were not accustomed to working scenes out of chronological order, but overall, they found it helpful towards understanding their

characters' arcs. During this week, I began setting up the first row of audience chairs for each rehearsal to help define the actors' playing space more clearly.

Week Three: September 25 – October 1, 2017

On Monday, the actors had their first run through off-book. Three of my actors were fully memorized and only called for their lines a handful of times. The other three actors' memorization was quite spotty. To progress the rehearsal, they were permitted to hold their scripts so that we could finish the run in a timely manner. That Tuesday and Wednesday, we continued to finesse scenes, starting at the top of the show and working through problem areas as needed. I called the entire cast to rehearsals because we would be moving between scenes rapidly. To utilize actors' time effectively, I would frequently engage all actors in scene work or exercises simultaneously. Taking the second day of rehearsal to understand each actor's process proved invaluable because I help them find techniques and exercises that would be the most effective for them. I remember an instance where I instructed Madeline to break down her monologue into its three main sections to help her find variation; individually coached Jack on how to create bold choices (an area in which he wanted to grow); asked Jeremy to run his lines; and guided Bennett, Michael, and Todd in an exercise on cue pick up where they played hot potato with a ball and threw it as they said each line. By giving the actors specific instructions and tasks, they were able to make discoveries on their own. This format allowed me to provide personalized attention to each actor while the others were working.

On Wednesday, some actors' memorization was still quite spotty. Therefore, I chose to spend an entire rehearsal taking detailed line notes on a run of the show. My thought process behind this decision is elaborated upon further in the "Dealing with Conflict" section.

On Friday I held an ‘Italian run’ – where the actors try to run the show as quickly as possible without speaking any faster. I chose this exercise because I had seen how it drastically improved the pacing of a production of *Our Town* I was part of my freshman year. The directors mentioned that actors must earn their pauses and space. A slightly faster pace helps the audience stay engaged in the show and makes any moments of stillness and silence more meaningful.

The actors brought in costume options they had at home this week, which allowed me to make a list of the pieces that I still needed to acquire from costume storage. We looked at everyone’s available pieces and chose what specific characters would be wearing. The actor and I would usually choose pieces with colors that we believed reflected the character’s personality.

#### Week Four: October 2-6, 2017

During week four, the structure of our rehearsals changed to focus on full runs of the show. I wanted to ensure that the actors felt confident with the show and thoroughly knew the order of the scenes. At each rehearsal, we would take an hour to revise the scenes that still required work, run the entire show, and then discuss my notes about that run. (A sample of my rehearsal notes is in Appendix E on page 76.) By Monday, all of the actors were finally off-book, and we could concentrate on finessing the final performance. Finishing four complete runs before tech weekend helped the actors become confident in their work before adding the technical elements. Additionally, Michael Tandy was not in Colorado that Thursday through Saturday as he had a schedule conflict. Therefore when Dr. Cecilia Pang, my Studio 5 advisor and my directing professor, came to give feedback on the performance on Thursday, I stood in for Michael Tandy with a script in my hand because I was familiar with his blocking. Dr. Pang’s notes helped guide the revisions I planned to make during the tech weekend and dress rehearsals.

The actors had Friday off to give them a break before eight straight days of technical rehearsals, dress rehearsals, and shows. While this day was initially on the rehearsal schedule, I wanted to ensure that my actors were well rested, did not burn themselves out, and had time to complete their homework.

Tech Weekend: October 7-8, 2017

At Dr. Pang's suggestion, I added a set piece upstage in the playing space to give the environment a more laboratory-like feel and created nametags to differentiate when the desk on stage right transitioned from belonging to Maurice to belonging to Rosalind. (Unfortunately, the nametags are not in the production photos we forgot to set them for the photo call.) She emphasized the need for the actors to create distinct arcs for their characters, show clear objectives, and show more passion in their performances. To put more emphasis on each character's arc, I asked each actor to "Please come with a clear idea of [their] character's objective and arc. For the arc, please know where your character begins at the top of the show, where they end, and three points in the middle that helped them get to that end." After Dr. Pang stated "The passion for the play must come through for science," I made sure to point out moments when my actors could display their characters' passion for science (Pang).

Dr. Pang mentioned that she loved two moments in the play that showed off the beauty of the language, such as the moment when Don discusses the A and B forms of DNA (see "A & B Form" on page 33 of Appendix I) and when the men pass around Rosalind's unpublished paper (see "The Paper 1", "The Paper 2" and "The Paper 3" on pages 68-70 of Appendix I). I noted that those were two of my favorite moments as well. Therefore, when she told me to "put a little bit of Elise into it [the show]," I conscientiously decided to create more moments that I absolutely loved within the show. These moments usually involved good timing, connection

between characters, or poetic stage pictures. After spending Saturday morning adding in lighting and projection cues with David Kocina and Michael Chen, we ran the show in the evening. I found the beats that had moments that I loved and wrote down all the ones that didn't have something I loved. The next day while David Kocina, our light board operator, added lighting cues to his list, I revised the mediocre scenes accordingly. Revising the scenes usually meant making the blocking more dynamic, tightening up comedic timing, finding how the energy in a scene changed over time, and encouraging the actors to lean into moments of joy and passion. (Many of these moments are depicted in the photos of Appendix I.)

#### Dress Rehearsal Week: October 9-10, 2017

The structure of these rehearsals mirrored the structure I utilized during week four. We would work on minor adjustments, do a group warm-up, run "fall call" (a quick rehearsal of all potentially physically dangerous moments and moments that needed precise timing), let the actors get into costume, run the show, and then discuss any notes I had about the performance. A week before, I asked the actors if they would like to do a group warm-up and what components they would like the warm-up to contain. The actors requested our customary check-in, a physical warm-up, work on projection and articulation, and a group energy exercise. Creating this routine established a sense of structure and helped bring the entire ensemble into the mindset of performance. Fall call was critical as I did not want to jeopardize my actors' safety. I repeatedly reminded them that their safety was my number one concern. Therefore, every night we would rehearse Ray pulling Rosalind to the ground, Rosalind's falling into Maurice's arms, and the chair lift. Additionally, we rehearsed putting on Rosalind's coat and Michael Chen handing a paper to James from offstage because these moments required specific timing and frequently had contained mistakes during rehearsal. The night before opening, I invited an audience of three

people. Having an audience there to react and laugh bolstered the energy within the actors' performances and reminded the actors that the show could be funny.

#### Performances: October 11-15, 2017

Once the show opened, I felt a great deal of relief and release. The production belonged to the ensemble and was now out of my hands. *Photograph 51* sold out for the full run of the production and the houses were mostly full, with only a handful of no-shows.

Since I always strive to improve my work, I took notes on feedback I received from friends, colleagues, and professors. A brief summary of this feedback is in Appendix J.

I took production photos at a photo calls on October 14<sup>th</sup> and October 15<sup>th</sup>. The photo calls provided a marvelous opportunity to capture my favorite stage pictures up close. These pictures are in Appendix I.

After the final performance, we struck the show and returned all props, costumes, and set pieces to their rightful homes. Once the space was clear and empty, the day concluded with one final check-in – a pleasant bookend to our rehearsal process.

#### Post Mortem: October 20, 2017

A few days after the show had closed, we held a post-mortem where the ensemble evaluated all elements of the production. The ensemble assessed what went well and areas of improvement for the following categories: stage management, props, sound, direction, projections, scenic design, actors, lights, costumes, and house management. Since I completed a great deal of work in most categories, I was excited to receive feedback on my work throughout the production process. The ensemble's feedback about my direction is in Appendix K.

### Appendix E: Rehearsal Notes Sample

10/10/17- Final Dress Rehearsal

Projections – pick up the cue on ‘tiniest repeating structures’

Lights – bring up SL table light on Maurice’s second narration line

Rosalind – take time to hold your space during the first monologue

Don – nice energy on your entrance

Lights – higher level on SL table during 1<sup>st</sup> letter & transition faster between letter and scene

Rosalind – slow down on 1<sup>st</sup> letter

Maurice – slow down on scientific words (We want the audience to be able to understand you.)

Watson and Crick – acknowledge Don’s comment about ‘specialties of nature’; how do you react?

Rosalind – nice adjustment to get in the line of sight

Gosling – work the “How do you like that?” timing; take one step DS before ‘lunch’ moment to clean up sight lines; did the sit on the desk feel natural to you? (Could we make it easier by having Maurice move the Signer DNA US on the desk?)

This sample displays the format in which I took notes, how I referred to actors by their characters’ names, and the type of changes I wanted to make. I focused on small details, actor coaching, gave praise, explained my motivation for some notes, and helped actors problem solve. This sample represents about half a page of notes. During the average run of the show, I would take approximately four pages of notes.

### Appendix F: Production Video

The video will be uploaded with the final electronic copy.

### Appendix G: Music Selections

The songs that I chose for the pre-show and the post-show are listed below with brief notes about why I selected them and how their lyrics parallel relationships or themes within the play.

Pre-Show Music (in order)

- “Ain’t That a Shame”<sup>22</sup> – This song was chosen due to the lyrics’ emphasis on shame and assigning blame. There is shame in how Rosalind’s story has been told in the past and the characters are trying to avoid placing blame on themselves for how her story ends.
- “Runaway”<sup>23</sup> – The lyrics to this song discuss a love relationship that should have succeeded yet did not work out. This parallels Rosalind’s potential romantic relationships with Don or Maurice.
- “You Don’t Know Me”<sup>24</sup> – The lyrics and the title of the song parallel Rosalind and Maurice’s lack of connection. This song felt apt because they both express that they aren’t ‘that kind of person’ when each of them makes erroneous assumptions about each other at different points during the show.
- “It Isn’t Right”<sup>25</sup> – The lyric “It isn’t right to make me blue” could parallel the possible unrequited love from Maurice to Rosalind.
- “Good Timin’”<sup>26</sup> – These lyrics emphasize the importance of timing, a factor that kept the King’s scientists from the discovery. The rapid beat in the background drives the piece forward and emphasizes the idea of a race.

---

<sup>22</sup> “Ain’t That a Shame” was performed by Fats Domino; written by Dave Bartholomew and Fats Domino; and produced by Dave Bartholomew.

<sup>23</sup> “Runaway” was performed by Del Shannon and written by Del Shannon and Max Crook.

<sup>24</sup> “You Don’t Know Me” was performed by Jerry Vale, Percy Faith & His Orchestra; written by Cindy Walker and Eddy Arnold; and produced by Al Ham, Ernie Altschuler, Mike Berniker, Mitch Miller, and Robert Morgan.

<sup>25</sup> “It Isn’t Right” was performed by The Platters.

<sup>26</sup> “Good Timin’” was performed by Jimmy Jones; written by Clint Ballard Jr. and Frederick K. Tobias; and produced by Otis Blackwell.

- “You Got What It Takes”<sup>27</sup> – Rosalind and each of the scientists have what it takes to make the discovery. The song speaks more about love, once again providing parallels to love relationships in the play.
- “Stand by Me”<sup>28</sup> – This song is one of my favorites on this playlist. Each character seeks connection and camaraderie from others. What matters in the end is who *stands by them* when the going gets tough.
- “Everyday”<sup>29</sup> – This song emphasizes the pressure of the race through sound of a clock ticking in the background and the use of the lyrics “getting closer” and “every day it’s a getting’ faster.” This was final song before the show started.

#### Post-Show Music (in order)

- “Do Right Woman, Do Right Man”<sup>30</sup> – I chose this song for the curtain call because both the women and the men wronged each other throughout the play. The relationships did not fail in a single moment but disintegrated through a series of moments of disconnection. This song additionally emphasized the frame of our production – how this play occurred in Maurice’s attempt to rewrite the past and do right.

---

<sup>27</sup> “You Got What It Takes” was performed by Marv Johnson; written by Berry Gordy, G. Gordy, Gwen Fuqua, Marv Johnson, R. Davis, Roquel Davis, and Tyran Carlo; and produced by Berry Gordy.

<sup>28</sup> “Stand by Me” was performed by Ben E. King and Stan Applebaum. It was written by Ben E. King, Kerry Leiber, and Mike Stoller.

<sup>29</sup> “Everyday” was performed by Buddy Holly; written by Buddy Holly and Norman Petty; and produced by Norman Petty.

<sup>30</sup> “Do Right Woman, Do Right Man” was performed by Aretha Franklin; written by Chips Moman and Dan Penn; and produced by Jerry Wexler.

- “Sorry”<sup>31</sup> – This song acts as an apology for the injustices Rosalind endured. This song utilizes a 50s style to cover the modern song “Sorry” by Justin Bieber. This song helps transition the audience from the 50s world of the play into the modern world.
- “MMMbop”<sup>32</sup> – This 50s adaptation of a modern song concluded the sound design for the show, ending the audience’s experience on a more positive note. The lyrics remain relevant to the play because they talk about the disintegration of relationships and holding on to people who are important to you.

---

<sup>31</sup> “Sorry” was performed by Scott Bradlees’s Postmodern Jukebox and written by Julia Michaels, Justin Bieber, Justin Tranter, Michael Tucker, and Sonny Moore.

<sup>32</sup> “MMMbop” was performed by Kenton Chen, Luke Edgemon, Mario Jose, Matt Bloyd, and Scott Bradlees’s Postmodern Jukebox. It was written by Isaac Hanson, Taylor Hanson, and Zac Hanson.

#### Appendix H: Projections

The projections PowerPoint will be uploaded with the final electronic copy.

#### Appendix I: Stage Pictures Analysis and Design Photos

The stage pictures analysis and the design photos will be uploaded with the final electronic copy.

This appendix is formatted as a separate Word document to accommodate for the file size of the pictures.

#### Appendix J: Performance Feedback

Feedback:

- “Very ‘clean’ production”
- “It was clear that there was lots of thought put into it.”
- “Nice use of the stage. There was something for everyone to watch.”
- “It had a really pleasant pace. The show never lagged, and it held my interest.”
- “While the different locations were relatively clear, they could have been made clearer.”
- Three to four people understood the projections concept, came up to me and told me that they loved it! Many people didn’t completely follow the concept, but the ones that did gave me positive feedback.
- “I particularly like the details you provided with the projections[,] the props[,] the costumes.... super proud.” – Dr. Cecilia Pang

Appendix K: Post Mortem Notes

## Direction:

- Things that worked well:
  - Loved the direction
  - Very willing to make connection with actor/figure things out (haven't had that in a long time)
  - Came up and interacted and show us
  - Sit down with the text and appreciated that (helped the actor fall in love with script)
  - Got ton of compliments for the director
  - Appreciated the willingness to work closely with the actors (questions about motivation, intention, and making sure everyone knew what they were doing)
  - Liked the interest in their process as actors
  - Attention to detail with actors and text was helpful
  - Appreciated the amount of freedom you gave us
    - Kept encouraging to find new things even until opening
  - Created nice environment for experimentation
  - Helped discover objectives on own and knew where wanted them to go but helped them find the path to get there
    - Letting actors make discoveries on their own
  - Learning-friendly process
  - Really helpful to get to work with the text and make deeper connections to it than if being fed ideas
  - Organic process
  - Tailored it for each of us
    - Never had a director do that
    - Different activities at once to help everyone learn
  - Flexible
  - Treated us like people before treating us like actors
- Areas of improvement:
  - Some frustrations with the way we were breaking up the beats – helped when explaining how we were trying to go through all the arcs
  - People became stressed out when they didn't know when we would do the first full run
  - Would have liked to know about the structure of the rehearsal process earlier (big picture)
  - Could have been harder on actors when the work wasn't there or when people weren't doing what they should have been doing
    - Especially the third off-book week
  - Could have been more up front with asking more of us (sometimes too kind???)
  - Elise noticed that she looks at the ground a lot when she is staging (helps her see the bigger picture in her mind's eye but could lead to a lack of connection?) - not sure how this is perceived

## Works Cited

- Bogart, Anne, and Tina Landau. *The Viewpoints Book: A Practical Guide to Viewpoints and Composition*. 1st ed, Theatre Communications Group; Distributed by Consortium Book Sales and Distribution, 2005.
- DeVito, Joseph A. *Interpersonal Messages: Communication and Relationship Skills*. Third Edition, Pearson Longman, 2013.
- Evangelista, Madeline. *Photograph 51 Rehearsal*. Sept. 2017.
- Glassman, Gary. *DNA: Secret of Photo 51*. WGBH Educational Foundation, 2007.
- Howarth, Carolyn. *Interview about Carolyn Howarth's Directing Process*. 11 July 2015.
- Image. [https://www.google.com/imgres?imgurl=http://sourcesofinsight.com/wp-content/uploads/2011/03/image\\_thumb1.png&imgrefurl=http://sourcesofinsight.com/conflict-management-styles-at-a-glance/&h=216&w=454&tbnid=Wj6FZnWg8nRZjM:&tbnh=100&tbnw=211&usg=\\_\\_tuBaCLPU8J64kPT9j786JQ5xJ-Q%3D&vet=10ahUKEwi49q\\_DzN3XAhVK94MKHW-bAtAQ9QEIKjAA..i&docid=OgZQs9ld28xpJM&client=safari&sa=X&ved=0ahUKEwi49q\\_DzN3XAhVK94MKHW-bAtAQ9QEIKjAA](https://www.google.com/imgres?imgurl=http://sourcesofinsight.com/wp-content/uploads/2011/03/image_thumb1.png&imgrefurl=http://sourcesofinsight.com/conflict-management-styles-at-a-glance/&h=216&w=454&tbnid=Wj6FZnWg8nRZjM:&tbnh=100&tbnw=211&usg=__tuBaCLPU8J64kPT9j786JQ5xJ-Q%3D&vet=10ahUKEwi49q_DzN3XAhVK94MKHW-bAtAQ9QEIKjAA..i&docid=OgZQs9ld28xpJM&client=safari&sa=X&ved=0ahUKEwi49q_DzN3XAhVK94MKHW-bAtAQ9QEIKjAA). Accessed 27 Nov. 2017.
- Knapp, Mark L., and Anita L. Vangelisti. *Interpersonal Communication and Human Relationships*. 6th ed, Pearson Allyn & Bacon, 2009.
- Kocina, David. *Port Mortem Feedback*. 20 Oct. 2017.
- Pang, Cecilia. *Dr. Cecilia Pang's Feedback on a Run of Photograph 51*. 6 Oct. 2017.
- Sieburg, Evelyn. "Confirming and Disconfirming Organizational Communication." *Communication in Organizations*, West Publishing, 1976, pp. 129–49.

- Thomas, Kenneth W, and Ralph H Kilmann. "An Overview of the Thomas-Kilman Conflict Mode Instrument (TKI)." An Overview of the TKI | Kilmann Diagnostics, 2017, [www.kilmanndiagnostics.com/overview-thomas-kilman-conflict-mode-instrument-tki](http://www.kilmanndiagnostics.com/overview-thomas-kilman-conflict-mode-instrument-tki).
- Watson, James D. *The Double Helix: A Personal Account of the Discovery of the Structure of DNA*. Simon & Schuster, 2001.
- Ziegler, Anna. *Photograph 51*. Dramatists Play Service, 2015.
- . *Photograph 51*. Dramatists Play Service, 2011.