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2019-2020

Article

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8-5-2020

## Accessibility and Simplification

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### Recommended Citation

Bechtold, Leah (2020) "Accessibility and Simplification," *The Mall*: Vol. 4 , Article 6.  
Retrieved from: <https://digitalcommons.butler.edu/the-mall/vol4/iss1/6>

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## Accessibility and Simplification

*Leah Bechtold*

Lauren Gunderson's play *Silent Sky* tells the life story of Miss Henrietta Swan Leavitt and the women who worked alongside her discovering Cepheid stars and variables which provided the rudimentary base for the modern measurement of the universe. Not uncommon from many other theatrical works, *Silent Sky* includes few characters and just eleven scenes. In these few pages and scenes, Gunderson covers a span of time from 1900 to 1918 and then beyond. To keep her audience captivated, *Silent Sky* runs at the average production time of two hours. By following this rule, Gunderson makes Miss Leavitt's life story and remarkable discoveries understandable and memorable to individuals with many interests and backgrounds, but it comes at a cost. Gunderson sacrifices historical and scientific details with oversimplification and stereotyping. In *Silent Sky*, Gunderson makes scientific ideas accessible, yet leaves out Edward Pickering's instrumental role in Miss Leavitt's scientific tenure, oversimplifies the process it took her to discover Cepheid variables, and furthers the common stereotypes of scientists.

*Silent Sky's* five characters include: Henrietta Leavitt, Margaret Leavitt, Peter Shaw, Annie Cannon, and Williamina Fleming. Of these characters, Annie Cannon and Williamina Fleming truly worked alongside Miss Leavitt and Margaret Leavitt introduced the theme of family versus occupation as Miss Leavitt's sister. Peter Shaw, Miss Leavitt's fictional love interest, takes precedent over a real and critical man during Miss Leavitt's time as a computer and astronomer at Harvard. Edward Pickering was an astronomer and physicist himself and in 1876, was hired to take over the Harvard observatory when he was just thirty years old (Johnson 15). Miss Leavitt worked under Pickering for a majority of her career. She fell ill on multiple occasions and on multiple others had to return home to Wisconsin to care for her family. At each of these setbacks to her scientific research, Pickering supported her. He promised her a role at Harvard when she returned and wrote letters to communicate with her. He even sent star plates to her location and asked her to continue her research on Cepheids from many miles

away. Both biographically and scientifically, Pickering played a key role in Miss Leavitt's life. Yet for the sake of drama and theatre, not everyone finds a supporting role. Gunderson chose to exclude Pickering from her play and in turn, sacrificed the opportunity to celebrate the individuals behind the scenes who support scientists from afar.

In order to make the discovery of Cepheid stars and variables as simple as possible, Gunderson had to abandon some details. Science in theatre should engage an audience, not confuse them. A 2000 *Wall Street Journal* review of the plays *Copenhagen* and *Tantalus* illustrate why Gunderson needed to keep the astronomy light and the plot ever changing:

'I couldn't follow the science -- which is what they were talking about most of the time,' says Marianne Johnson, a New York business consultant who saw "Copenhagen," the hit Broadway show about atomic scientists Niels Bohr and Werner Heisenberg and the making of the first atomic bomb. 'It's hard to keep track of who all the characters are,' Martin Lewis, a Denver laboratory designer, said when he was four hours into the 10-hour "Tantalus" in Denver. Most of the 27 actors in the play based on Greek mythology wore feature-obscuring polymer masks (Gubernick).

Composing a play about nuclear physics and the creation of the first atomic bomb compares to the challenges of writing a play about one woman's quest to measure the universe. Gunderson did not create a small character list and romantic plot on a whim. *Tantalus* includes 27 characters and reviewers expressed difficulty following the relationships and purposes of each character; *Silent Sky* includes five. Audience members only need to keep track of five people at all times and this simplification limits concerns of audience confusion regarding character relationships. Not only that, each character has a specific dialect, trait, or even spotlight that identifies them. Gunderson recognized the importance of keeping her work accessible to as many as possible, and the choice to limit the character list may not directly follow Miss Leavitt's life, but does follow literary guidelines and recommendations.

George Johnson's biography of Miss Leavitt spans 130 pages and includes her entire scientific story. Clearly, eleven scenes cannot cover what a biography elaborates on in 130 pages. For the sake of time and audience engagement, Gunderson had to eliminate some aspects of Miss Leavitt's life. One critical piece of information that Gunderson simplified, and even romanticized, was the multitude of steps it took Miss Leavitt to fully grasp Cepheid stars and then calculate her Cepheid variables. Johnson writes that in 1912, Miss Leavitt's graph plotting 25 variable stars in the small Magellanic cloud and explanation of how these stars represented relative distance was published in a *Harvard Circular* (Johnson 44). It took her years to even come

this far. She had to discover these variable stars, recognize a pattern between them, identify and plot them, and then write a report for review. Miss Leavitt did not have a lightbulb moment. In fact, a more complete report she wrote was published in the *Annals of the Astronomical Observatory of Harvard College* in 1917. This report included the measurement of 96 stars and spanned 184 pages (Johnson 57). This report concluded that an astronomer could tell the distance between stars from their magnitudes. The longer a star's period in a blink, the farther away the star was. Miss Leavitt's own words regarding her scale say, "For stars between the tenth and sixteenth magnitudes...corrections are likely to be minute. For brighter and fainter stars, sensible changes may be made ultimately, but the scale is probably a close approximation to the true one" (Johnson 58). The minutia of her findings does not interest an audience. Five years of research and analysis includes little drama and an abundance of complexities. For the theatre, this journey needs to occur in a snap.

Miss Leavitt experiences a lightbulb moment in Act I Scene VI of *Silent Sky* while her sister Margaret plays the piano. On page 41 Margaret begins playing the symphony she has been working on composing:

MARGARET. (*Margaret plays a simple, lovely piece on the piano... Henrietta notices the stars above her starting to shine again...They appear in time with Margaret's music...Margaret stops playing – the stars stop blinking.*) What's wrong?

HENRIETTA. It's – it's tonal. [...] The stars are music. [...] The pattern. The numbers – When you put them in the right order – they're – Oh my God the blinking is music – so simple – Right there... (Gunderson 41-42).

In the theatrical version, Miss Leavitt's discovery becomes diluted. While scientific breakthroughs can occur as lightbulb moments, *Silent Sky* discounts the years of research and determination Miss Leavitt encountered. This discovery does not completely follow Miss Leavitt's biography; however, it falls in line with critiques of scientific plays. In the play *Copenhagen* which revolved around atomic scientists and the creation of the first atomic bomb, some reviewers found it too difficult to understand the science. In order to reach a broad audience and make Miss Leavitt's name well known, some of the hard science had to soften. A play that discusses plotting of hundreds of variable stars in Magellanic clouds and Miss Leavitt's work reporting the connection between the star's periods and distances from each other may not entrance an audience as well as a romanticized moment with Margaret does. The stage, music, and dialogue all lead up to this epiphany. Everyone has experienced an epiphany before whether academic or personal, and with this addition of realization happening all at once, Gunderson makes Miss Leavitt's work relatable.

While importance lies in making science and astronomy accessible, authors must walk a fine line when representing scientists realistically. In *Silent Sky*, Gunderson works to keep Miss Leavitt's profession at the forefront, but also must make her story engaging to thespians and those uninterested in science. She oversimplifies ideas and adds a love story between Peter Shaw and Miss Leavitt. Johnson's *Miss Leavitt's Stars* shares that this love story never occurred. Miss Leavitt remained single her entire life and dedicated her life's work to scientific advancement and astronomy. While these ideas contradict, Gunderson still conveys the Cepheid stars and variables just with the addition of a love story. A 2016 study published in *The Journal of Science and Education* discusses how elementary students learn science from plays. Students from an urban background watched a play about scientists and how they collaborate with other researchers and professionals. The playwrights worked to include scientists feeling homesick, collaborating with engineers, having different ethnic backgrounds, and feeling emotions. Interestingly, the students learned, but did not change their preconceived notions of scientists. Yet the students retained the information included in the play:

“...less than half of the student questionnaires and drawings of scientists indicated...growth as a result of the play. That being said, numerous students were able to tell us what they learned from the play and many questionnaire responses and drawings indicated such learning” (Burgin).

This example shows that even when playwrights take steps toward realistic representation, sometimes stereotypes persist. A tradeoff exists between accurately representing history and a life story and sharing an abridged life story and the general discoveries of an individual with an audience. Even when playwrights highlight accuracy, audience members can allow stereotypes to take over. People may retain the information learned in a play, but only if the story engaged them.

Gunderson works to make Miss Leavitt's story accessible to people of varying backgrounds by withdrawing some details and facts. A 2009 report published in the *International Journal of Science Education* discusses two key strategies used to present science in theatre:

The first strategy aims to simulate social events, usually of the adult world, which students have not yet experienced. Often employed in the form of extended role plays, these convey topics which relate to affective contexts of social, cultural, and intellectual discourse which occur in science contexts... A second strategy employs mime and role play to convey abstract physical phenomena, which would be otherwise unobservable in the classroom (Dorion).

In *Silent Sky*, audience members see role play at work. Gunderson elaborates on intellectual discourse and uses imagery and music to discuss the physical phenomena of Cepheid stars that audience members otherwise struggle visualizing. Miss Leavitt's story gets attention, but at the cost of introducing an engaging love story and sacrificing the years of toil and studies it took to reach a final conclusion of Cepheid variables.

*Silent Sky* purposefully exposes Miss Leavitt and Cepheid stars to the realm of popular culture. Audience members leave knowing her name and the name of Cepheid stars. However, they also leave with an incorrect perception of how Cepheid stars apply to astronomic measurement today and believe Peter Shaw and Miss Leavitt experienced a Harvard romance. Scientists work and study in *Silent Sky* and never come near a chemistry set or lab coat, but audience members rarely have their minds changed and stereotypes challenged by plays. Gunderson honors Miss Leavitt and follows the skeleton Johnson outlines in *Miss Leavitt's Stars*, but she also adapts her story for the stage. While this is not inherently wrong, it is frustrating to watch a life story go through changes to make it modern and exciting. *Silent Sky* effectively allows for Miss Leavitt's life and discoveries to receive acclimation and recognition, yet oversimplification of scientific ideas and stereotyping of scientists occur to make it stage worthy and alter the perceived course of Miss Leavitt's life.

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