

Preparing the Eclipse Soundscapes Mobile Application for 2023: Applying Lessons Learned from 2017 to Guide Language Choices that Improve the Accessibility and Inclusiveness of the App’s Scientific Content to Make Eclipses More Engaging for Everyone!

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Abstract

The Eclipse Soundscapes Project originally launched to make the “Great American Eclipse” of 2017 accessible to everyone, with a special focus on users who are blind or have low vision (BLV). Its first project was a mobile application (app). The app includes illustrative audio descriptions of eclipses, as well as an interactive “rumble map” that allows users to conceptualize an eclipse through touch and sound. Development of the Eclipse Soundscapes (ES) mobile application is led by the Advanced Research in Inclusion and STEAM Accessibility (ARISA) Lab team with the support of NASA’s Heliophysics Education Activation Team. One of the lessons learned in the original 2017 ES mobile application (ES 1.0) development was a greater understanding of how language choices impact accessibility and inclusion. It is clear that sharing information in text, in audio, and in a tactile way not only makes information more accessible and inclusive but also more impactful for everyone! With GBH National Center Accessible Media (NCAM) and Subject Matter Experts (SME), scientific annular eclipse descriptions were transformed into accessible descriptions that focused on utilizing tactilely relevant vocabulary. In conjunction with the tactile elements of the ES mobile app, this more inclusive language created an opportunity for more members of the BLV community to experience the 2017 total solar eclipse autonomously. However, with this success, a new challenge was discovered. We created more linguistically accessible descriptions, but they read at a very high level - often university level. This created a new inclusion and accessibility challenge when trying to reach the general public. In this presentation we will discuss how we addressed this challenge as we worked on ES 2.0 via collaborations with SMEs, accessibility partners, AND educators to create scientifically accurate annular eclipse descriptions that are linguistically appropriate for the BLV community as well as at a readability level to support a more diverse audience. This work was supported by a subaward from NASA Heliophysics Education Activation Team, supported by NASA under cooperative agreement number NNH15ZDA004C.



Advanced Research in Inclusion & STEAM Accessibility Lab

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Hi! My name is MaryKay Severino. I am the Education director at ARISA Lab. I co-founded ARISA Lab with Dr. Henry "Trae" Winter, who is the Chief Scientist at ARISA Lab.

ARISA is an acronym that stands for Advanced Research in Inclusion and STEAM Accessibility. The acronym within our acronym, STEAM, stands for Science, Technology, Engineering, Art and Math. This name, and our **vision statement, Making the Universe of Learning Accessible and Engaging for Everyone** is at the root of everything we do and helps us determine which projects and endeavors our company will support.

During this presentation, titled Preparing the Eclipse Soundscapes Mobile Application for 2023, I will discuss how we are Applying Lessons Learned from 2017 to Guide Language Choices that Improve the Accessibility and Inclusiveness of the App's Scientific Content to Make Eclipses More Engaging for Everyone!



Eclipse Soundscapes Project: (ES) Mobile Application



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Eclipse Soundscapes Project: (ES) Mobile Application



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Eclipse Soundscapes

The Eclipse Soundscapes mobile application is an engaging multi-sensory eclipse experience universally designed for ALL, with a special emphasis on accessibility to ensure the inclusion of people who are blind or low vision.



Corona

During the totality, the moon completely covers the sun's glowing disk, and the sun's outer atmosphere is revealed. As if the moon were the center of a celestial sunflower, the corona appears as soft white petals, massive flames of faint light that taper out across the sky. Closer to the surface of the moon's flat ebony circle, the corona is a swirling chaos of loops and filaments. Intense fiery lines of light appear to ignite the moon's black edge.

On the rumble map, explore the difference between the moon and the sun's corona. You will hear/feel variations as your fingers pass over different features of the corona.

The corona is the thin outer atmosphere of the Sun. With temperatures of over 1 million degrees Fahrenheit, it radiates light in wavelengths that are too short for the human eye to see.



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The app includes illustrative audio descriptions of eclipses developed in partnership with NASA SMEs and GBH National Center for Accessible Media (NCAM).

In the first image above there is a screenshot of the app as it shares information about the Corona, a feature of a total solar eclipse. It is done visually with an image of the Corona, as well as in text, and via audio. During an actual event, these descriptions of the features of an eclipse start automatically as the eclipse begins. They progress from feature to feature automatically. In this way a person does not need to see the eclipse to experience its wonder. Nor is a person required to wait for a friend to share the information with them.



Eclipse Soundscapes Project: (ES) Mobile Application



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The app also includes an interactive “rumble map” that allows users to conceptualize an eclipse through touch and sound.

The Rumble Map is a tactile element. When an eclipse is not happening, a user can run their finger across an eclipse feature image and when that person’s finger runs over an area of light, a series of sounds play that are specifically designed to vibrate the mobile device. These sounds and vibrations allow users to “hear” and “feel” an eclipse.

On the right side of the slide there is picture of some members of the app development team testing the Rumble map on an iPad. Corey is running his fingers across the image of the corona on an ipad in order to feel the vibrations.



Eclipse Soundscapes Project: (ES) Mobile Application

LESSON LEARNED: Language Matters



Language choices impact accessibility

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One of the lessons learned in the original 2017 ES mobile application (ES 1.0) development was a greater understanding of how language choices impact accessibility. It is clear that sharing information in text, in audio, and in a tactile way not only makes information more accessible but also more impactful for everyone! Let's check out an example.



Eclipse Soundscapes Project: (ES) Mobile Application

LESSON LEARNED: Language Matters



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508 Compliant Language VS Accessible Illustrative Descriptions

In the app these images are described using language that was intentionally chosen through collaborations with GBH National Center for Accessible Media (NCAM) in a more accessible way.

Listen to these two descriptions of an image of Baily's Beads. The image is not showing on the slide intentionally so you can focus on the listening to the language.

First, a section 508 compliant description. "Picture of Baily's Beads."

Now, a description developed through collaborations GBH NCAM "On the right side of the moon, orbs of glowing sunlight shimmer off the edge of the moon's black disk. Called Baily's Beads, these final areas of the sun's light appear as glimmering pearls on a wire, made intensely bright by the absence of light surrounding them."



Total Solar Eclipse 2013 © 2013 Işık observatory Petr Hudek, Jan Sládek © 2014 Mladotv Druckstudio

BLV BEST PRACTICES AND ALT TEXT

INCLUSIVE ALT TEXT

On the right side of the moon, orbs of glowing sunlight shimmer off the edge of the moon's black disk. Called Bailey's Beads, these final areas of the sun's light appear as glimmering pearls on a wire, made intensely bright by the absence of light surrounding them.

VS

SECTION 508 COMPLIANT ALT TEXT
Picture of Bailey's Beads

I've just made the image I described appear on the slide. Hopefully the descriptions I read demonstrate the importance of language when it comes to accessibility.

With GBH National Center Accessible Media (NCAM) and Subject Matter Experts (SME), scientific eclipse descriptions were transformed into accessible descriptions that focused on utilizing tactilely relevant vocabulary. In conjunction with the tactile elements of the ES mobile app, this more accessible language created an opportunity for more members of the BLV community to experience the 2017 total solar eclipse independently. However, with this success, a new challenge was discovered. Readability. Many of the accessible descriptions developed in 2017 were at 11-12th grade reading levels, like the Bailey's Beads description, and some as high as college level. To be more inclusive and reach and engage more people, we are aiming to keep readability levels at middle school or junior high level. We are addressing this new challenge as we add annular eclipse information in Eclipse Soundscapes 2.0



Eclipse Soundscapes Project: (ES) Mobile Application

APPLYING the LESSON LEARNED: Language Matters



Considering Accessibility AND Readability when it comes to language choices.

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In preparation for the 2023 annular eclipse, annular eclipse images, information, audio, and rumble map representations are being added. In this 2.0 version we are again working with NASA SMEs for scientific content and GBH NCAM to ensure accessible language, but we are now also working with educators to ensure that readability is considered, which will make this information more inclusive.



APPLYING the LESSON LEARNED: Readability Considerations



1. **Sentence Structure** - Simple sentences with only a few compound & complex sentences
2. **Vocabulary** - Keep the multisyllabic words to the scientific words you'd like the public to know.
3. **Limit Jargon**
4. **Similes are great, but no idioms**



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This slide has a list of some of the things we are considering as we work on the readability of eclipse descriptions:

1. **Sentence Structure** - Simple sentences with only a few compound & complex sentences
2. **Vocabulary** - Keep the multisyllabic words to the scientific words you'd like the public to know. For example, we removed "obsidian disk" from our descriptions but kept "annularity"
3. **Limit Jargon**
4. **Similes are great, but no idioms** - idioms are very culture specific



APPLYING the LESSON LEARNED:

Language Matters

On the right side of the moon, orbs of glowing sunlight shimmer off the edge of the moon's black disk. Called Baily's Beads, these final areas of the sun's light appear as glimmering pearls on a wire, made intensely bright by the absence of light surrounding them. Baily's beads are caused because the moon's surface is not a smooth, perfect sphere. Rays of light peer through the ravines and valleys between mountains on the moon causing this spectacular feature.

Readability Consensus

Based on (7) readability formulas, we have scored your text:

Grade Level: 11

Reading Level: standard / average.

Reader's Age: 15-17 yrs. old (Tenth to Eleventh graders)

Baily's Beads look like a few glowing pearls at the ends of the crescent. Baily's Beads occur because the moon's surface is not smooth. It is covered by mountains and valleys. Bailey's Beads are caused by sunlight beaming through the mountains and valleys on the moon when the sun begins to peek around the moon's edge.

Readability Consensus

Based on (7) readability formulas, we have scored your text:

Grade Level: 7

Reading Level: easy to read.

Reader's Age: 11-13 yrs. old (Sixth and Seventh graders)

To share an example with you, the previous Baily's beads description that I read earlier is at a readability level best suited for 11th graders. In the annular eclipse version of Baily's Beads we considered the readability level. The version I am about to read is at a 7th grade readability level. (Read right side)

Readability Formulas Used:

Flesch Reading Ease

Gunning Fog

Flesch-Kincaid

The Coleman-Liau Index

The SMOG Index

Automated Readability Index

Linsear Write Formula



Thank you!



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ARISA
A network of dots below the text.



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I hope the work we've done to create scientifically accurate annular eclipse descriptions that are linguistically appropriate for the BLV community as well as at a readability level to support a more diverse audience supports your efforts to share your work with your communities. Please learn more at our website EclipseSoundscapes.org and stay updated by following us on Facebook & Instagram [@EclipseSoundscapes](https://www.instagram.com/EclipseSoundscapes) and on Twitter [@EclipseSoundUDL](https://twitter.com/EclipseSoundUDL).

Thank you