

Introduction to Computation for the Humanities and Social Sciences



CS 3
Chris Tanner

Lecture 13

“Wu-Tang Clan Ain’t Nuthin to
[Compare] With”
— Wu-Tang Clan

Lecture 13

- Sets
- Nested Iteration
- Text Analysis: readability
 - contributing factors
 - measures

New Data Structure!

- very similar to **Lists**
- A **Set** is an **unordered** collection of items (can store any data type)
- Collections which don't preserve the order in which elements are added are called **unordered**
- Doesn't support indexing

```
a = {1,2,3}  
a.add(4)  
if 2 in a:  
    print(a)
```

Sets

New Data Structure!

- Sets have no indices and no order!

```
students = set()  
students.add("jackie")  
students.add("emily")  
students.add("hank")  
students.add("emily")  
students[0] ← CRASHES
```

- So, you can't access specific items by its index.
If you need to maintain an order for your items,
use a List.

Sets

New Data Structure!

- very similar to **Lists**, but
- is incapable of storing duplicate items (maintains just 1 copy)

```
students = set()  
students.add("jackie")  
students.add("emily")  
students.add("hank")  
students.add("emily")  
print(students)
```

```
>>> students = {'emily', 'jackie', 'hank'}
```

Sets

New Data Structure!

- checking if an item is contained in the **Set** happens instantly (doesn't need to check each item one by one like **Lists**)

```
students = set()  
students.add("jackie")  
students.add("emily")  
students.add("hank")  
students.add("emily")  
  
if cur_student in students:  
    print(student + "is present!")  
else:  
    print(student + "is NOT present!")
```

When to use a Set()?

- Use a **Set()** when you only care about storing a collection of unique values (i.e., don't care about duplicates) and the order doesn't matter to you.
- Pros: super simple, fast data structure; never need to worry about indices.
- e.g., store license plate #'s or list of senator names.

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Iteration

- Remember, iteration allows us to loop through a given section of code (e.g., a specified number of times or through each item in a particular data structure that is Iterable)
- Just like how we can nest multiple if-statements, we can nest multiple iterations!

Nested Iteration

Example

```
cs3_students = ["chris", "riya", "laurel", ...]
eng16_students = ["piyush", "anqi", "jana", ...]

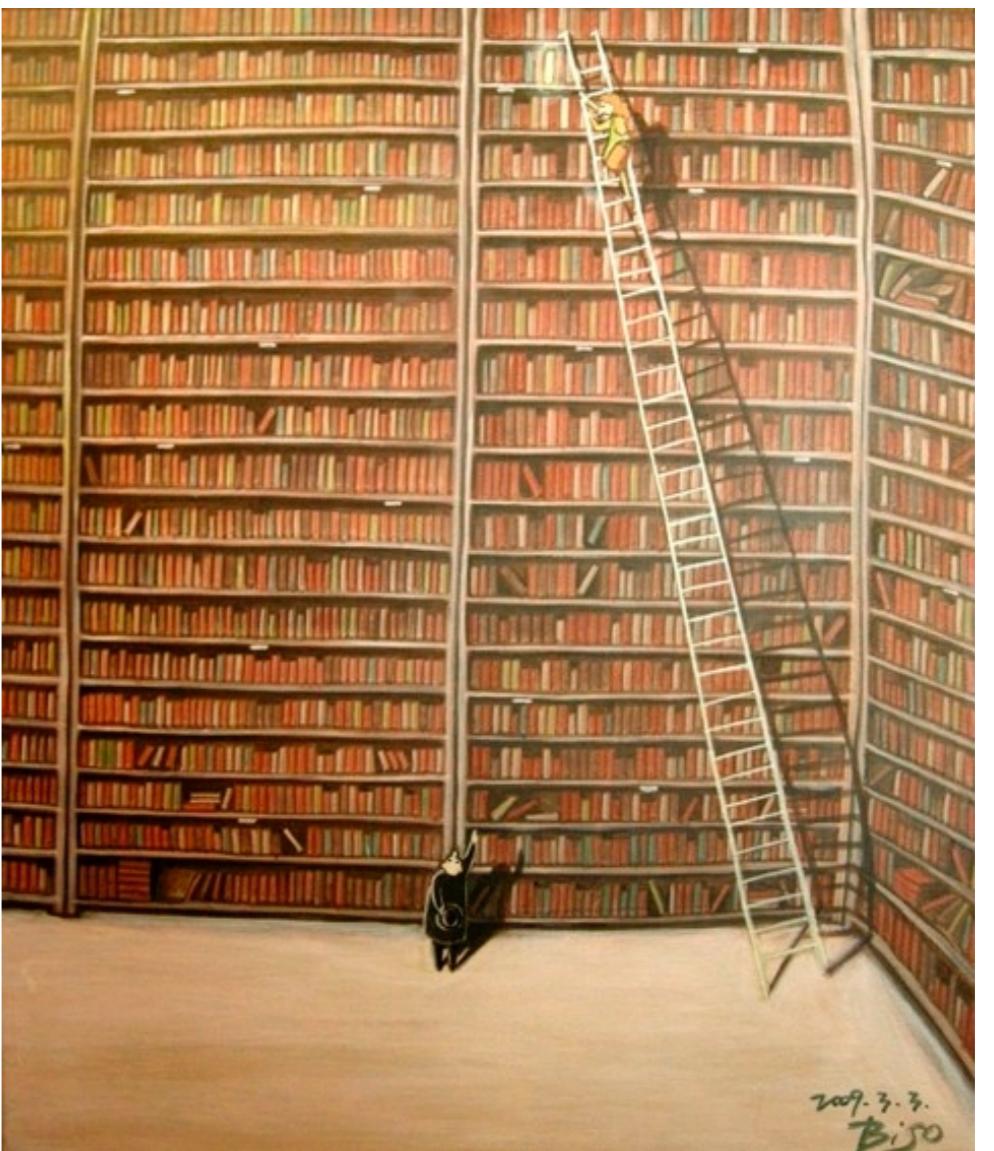
for cs3_student in cs3_students:
    for eng16_student in eng16_students:
        if cs3_student == eng16_student:
            print("classes have a student with same name!")
```

Lecture 13

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Text Readability

Problem: You want to promote reading for fun with your students and want to point them to grade-level appropriate books without having to read every single one



Text Readability

Problem: Your company is launching a new product and you are tasked with determining whether the instruction manual will be readable by its customers

Comcast.
ON DEMAND
Comcast Custom DVR 3-Device
Universal Remote Control



User Guide

OVERVIEW
The Comcast Custom DVR 3-Device universal remote will control up to three home entertainment devices, including a Digital Video Recorder enabled Cable Box (used by Comcast Systems).
The remote control requires installing two (2) new AA batteries (included) and some easy programming to control your devices. For best results, please read all programming instructions listed here. Also, keep this guide for future reference.

INSTALLING BATTERIES
1. Pull back the remote control's battery cover and remove it.
2. Insert the two (2) supplied AA batteries according to the + and - marks in the battery case.
3. Push the battery cover back into place.
4. Test the unit by pressing any mode key (i.e., **AUX**, **TV**, or **Cable**). If batteries are inserted correctly, the selected mode key will light.
NOTE: When the batteries need to be replaced, the remote control will stop working. Replace the old batteries and the unit will be restored to its full functionality, complete with your favorite settings.

FEATURES AND FUNCTIONS
Use the remote control's mode keys (i.e., **AUX**, **TV**, or **Cable**) to control a specific device. When pressed, the selected mode key will light, confirming your choice. Use the other keys to perform desired actions (see the following key chart).
NOTE: The selected mode will remain active until you press another mode key.

Press **AUX**, **TV**, or **Cable** once to select and control a device.
Press **Power** once to turn on or off the selected home entertainment device.
Use **Setup** for all programming sequences.
Press **All** on once to turn on or off all programmed devices in this order: **Cable**, **TV**, and **AUX**. After all devices are on, **Cable** is the active mode.
Press **ON DEMAND** once to access Comcast's ON DEMAND menu (not available in all areas).
In the **AUX** or **TV** mode, use the transport keys to control a VCR, PVR, or DVD player. To record a program on a VCR, press **REC** twice.
In the **Cable** mode, use the keys to control ON DEMAND programs.
Press **REPLAY** to replay the previous few seconds of a program.
Press **My DVR** to show a list of programs that have been recorded.
Press **LIVE** to return to watching live TV.
Use **Day+** (or **Day-**) to access interactive program guide functions on your Scientific Atlanta Explorer, Pioneer Voyager, or PACE cable box.
Use the keypad (0 - 9) to directly select the channels (e.g., 09 or 03).
In the **TV** mode, use this key to switch the TV's input to view TV or video programs.
In the **AUX** mode, use this key to switch the VCR, PVR (or DVR), or DVD player to view TV or video. For an audio device, use it to switch to an input source.
Use **Enter** to enter channels on some TV models or information on menu screens.
Use **Guide** to display the interactive program guide.
Use **Page+** (or **Page-**) to page up (or down) through menu screens and the interactive program guide.
NOTE: The selected mode will remain active until you press another mode key.

Press **PIP On-Off** to display the PIP Window.
>Use **PIP Swap** to switch the images and sound between the main and window pictures.
Use **PIP Move** to move the picture to different positions in the main picture.
Use **PIP CH +** (or **CH -**) to select the next higher or lower PIP channel.

works. If it still does not work, try Searching For Your Code.
NOTE: If the device does not have a **Power** key, press the **> (Play)** key.

7. For future reference, write your device code in the appropriate boxes below:
AUX Code:
Device Type: _____
TV Code:
8. Repeat steps 1 to 7 for another device you want to control.

PROGRAMMING DEVICE CONTROL
The Comcast Custom 3-Device universal remote is preprogrammed at the factory to operate the Cable Box supplied by your Comcast system, an RCA TV, and an RCA VCR (in the **AUX** mode). To control devices other than default brands (excluding the Cable Box), perform the below steps; otherwise skip this section.
1. Turn on a device (e.g., VCR or DVD Player) and, if applicable, insert media, (e.g., video cassette or disc).
NOTE: Please read steps 2 to 6 completely before proceeding. Highlight or write down the codes and device you wish to program before moving on to step 2.
2. On the remote control, press a device key once (i.e., **AUX** or **TV**).
NOTE: Use the **AUX** key to program control of an Audio Amplifier or Receiver, a DVD Player, a Home-Theater In-A-Box Device, a PVR (or DVR), or a VCR.
3. Press and hold **Setup** until the selected mode key blinks twice, then release **Setup**.
4. Locate the code for your device in Manufacturer's Codes on the back of this user guide. Brands are listed in alphabetical order with the most popular codes listed first.
5. Enter the first four-digit code for your device. If you perform this procedure correctly, the selected mode key will blink twice.
NOTE: If you enter an invalid code, the selected mode key will display one long blink and exit the programming mode. Repeat steps 2 to 5 with a valid code.
6. Aim the remote control at your device and press **Power** once. The device should turn off. If it does not respond, repeat steps 2 to 6, trying each code listed for your brand until you find one that

works. If it still does not work, try Searching For Your Code.
NOTE: If the device does not have a **Power** key, press the **> (Play)** key.

3. Enter **9 - 9 - 0**. The **TV** key will blink twice.
4. To view the code for the first digit, press **1** once. Wait 3 seconds and count the number of times the TV key blinks (e.g., 3 blinks = 3) and write down the number in the leftmost TV Code box (at end of this section).
NOTE: If a code digit is "0," the selected mode key will not blink.
5. Repeat step 4 three more times for the remaining digits. Use **2** for the second digit, **3** for the third digit, and **4** for the fourth digit. Finish writing down the code in the TV Code boxes (at end of this section).
6. To check another device code, repeat steps 1 to 5, but substitute the **AUX** key for the auxiliary device you are checking. Write down the codes in the appropriate boxes below:
AUX Code:
Device Type: _____
TV Code:
7. On the remote control, press and hold **Setup** until the **TV** key blinks twice, then release **Setup**.

8. Enter **9 - 9 - 3** and then press **VOL+** once. The mode key will blink four times confirming unlock.
9. Now, volume controls for all devices can be independently controlled in their own modes.

SEARCHING FOR YOUR CODE
If your home entertainment device does not respond to the remote control after trying all of the codes listed for your brand, or if your brand is not listed at all, try searching for your code.
For example, after trying all of the codes for your TV, you still cannot get the remote control to operate your TV, then:
1. Turn on your TV.
2. On the remote control, press **IV** once. Then press and hold **Setup** until the **TV** key blinks twice, then release **Setup**.
3. Enter **9 - 9 - 1**. The **TV** key will blink twice.
4. Aim the remote control at the the TV and slowly alternate between pressing **Power** and **IV**. Stop when the TV turns off. A working code has been found.
NOTE: In the search mode, the remote control will send IR codes from its library to the selected device, starting with the most popular code first.
5. Press **Setup** once to lock in the code. The **TV** key will blink twice.
6. To search for the codes of another device, repeat steps 1 to 5, but substitute the **AUX** key for the auxiliary device you are searching for.

CHECKING THE CODES
If you have set up the remote control using the Searching For Your Code procedure, you may need to find out which four-digit code is operating your equipment. Perform the following steps after setting up your device to find out which four-digit code operates your equipment. For example, to find out which code is operating your TV:
1. Turn on your TV.
2. On the remote control, press **IV** once. Then press and hold **Setup** until the **TV** key blinks twice, then release **Setup**.

3. Enter **9 - 9 - 3** and then press **VOL+** once. The mode key will blink four times confirming unlock.
4. If desired, repeat steps 1 to 3 of this section for each device that you want volume to be unlocked.
5. Now, after you select a device that has volume unlocked (e.g., **AUX**), pressing **VOL+**, **VOL-**, or **Mute**, will

De-Activating Channel Control Lock
1. On the remote control, press **Cable** once. Then press and hold **Setup** until the **Cable** key blinks twice, then release **Setup**.
2. Enter **9 - 7 - 3**. Press **CH-** once. The **Cable** key will blink four times.
3. Now, the remote control will provide TV or cable channel control capabilities while in the **TV** or **Cable** mode.

Re-Activating Channel Control Lock
1. On the remote control, press **Cable** once. Then press and hold **Setup** until the **Cable** key blinks twice, then release **Setup**.
2. Enter **9 - 7 - 3**. Press **CH+** once. The **Cable** key will blink twice.
3. Now, regardless if you select the **TV** or **Cable** mode, only the channel control capability of your cable box will be accessible.

TROUBLESHOOTING
PROBLEM: A mode key does not blink when you press a key.
SOLUTION: Replace the batteries with two (2) new AA batteries.
PROBLEM: During programming, a mode key displays one long blink.
SOLUTION: An invalid entry has occurred. Check the key to be entered and try programming again.
PROBLEM: A mode key blinks when you press a key, but home entertainment component does not respond.
SOLUTION: Make sure the remote control is aimed at your home entertainment device and is not farther than 15 feet away.
PROBLEM: The remote control does not control home entertainment devices or the commands are not working properly.
SOLUTION: Try all listed codes for the device brands being set up. Make sure they can be operated with an infrared remote control.
PROBLEM: **CH+, CH-, and Last** do not work for your RCA TV.
SOLUTION: Due to RCA design (1983-1987), only the original remote control will operate these functions.
PROBLEM: Changing channels does not work properly.
SOLUTION: If original remote control required pressing **Enter** to change channels, also press **Enter** on this remote control after entering the channel number.

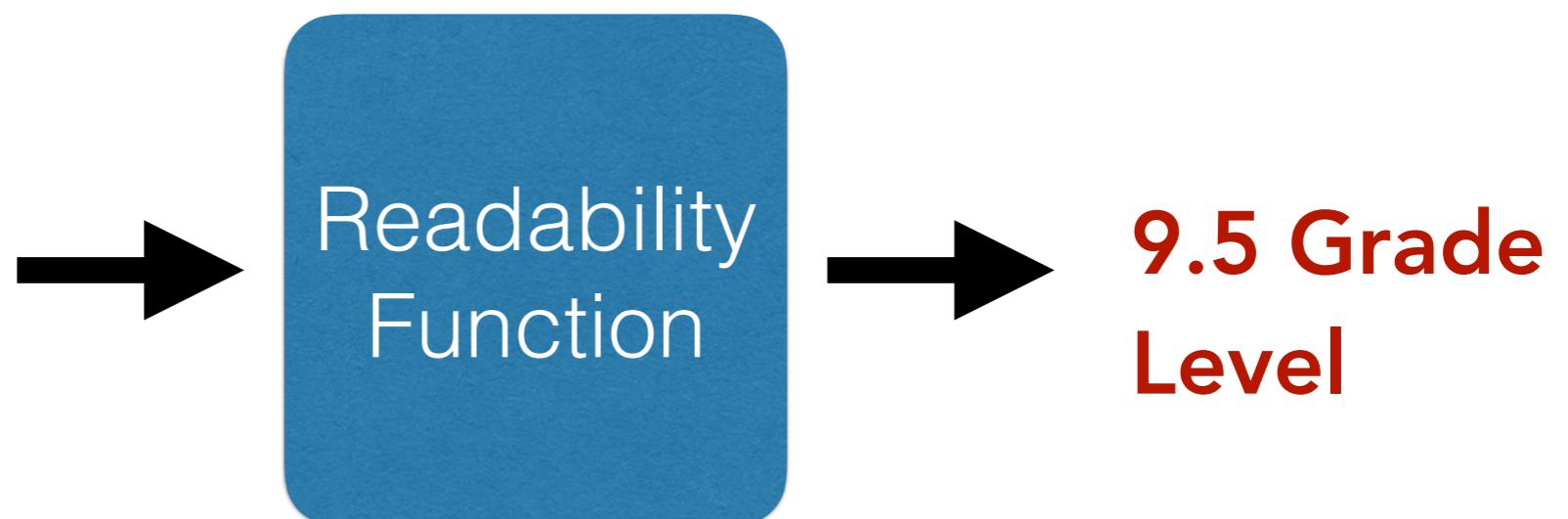
Text Readability

Problem: You are writing a speech for a political candidate that will reach an audience of millions. How do you ensure the message is understood by as many people as possible?



Text Readability

It was the best of times,
it was the worst of
times, it was the age of
wisdom, it was the age
of foolishness, it was
the epoch of belief, it
was the epoch of
incredulity, it was the
season of Light, it was
the season of Darkness,
it was the spring of
hope, it was the winter
of despair.



Charles Dickens - A Tale of Two Cities

Lecture 13

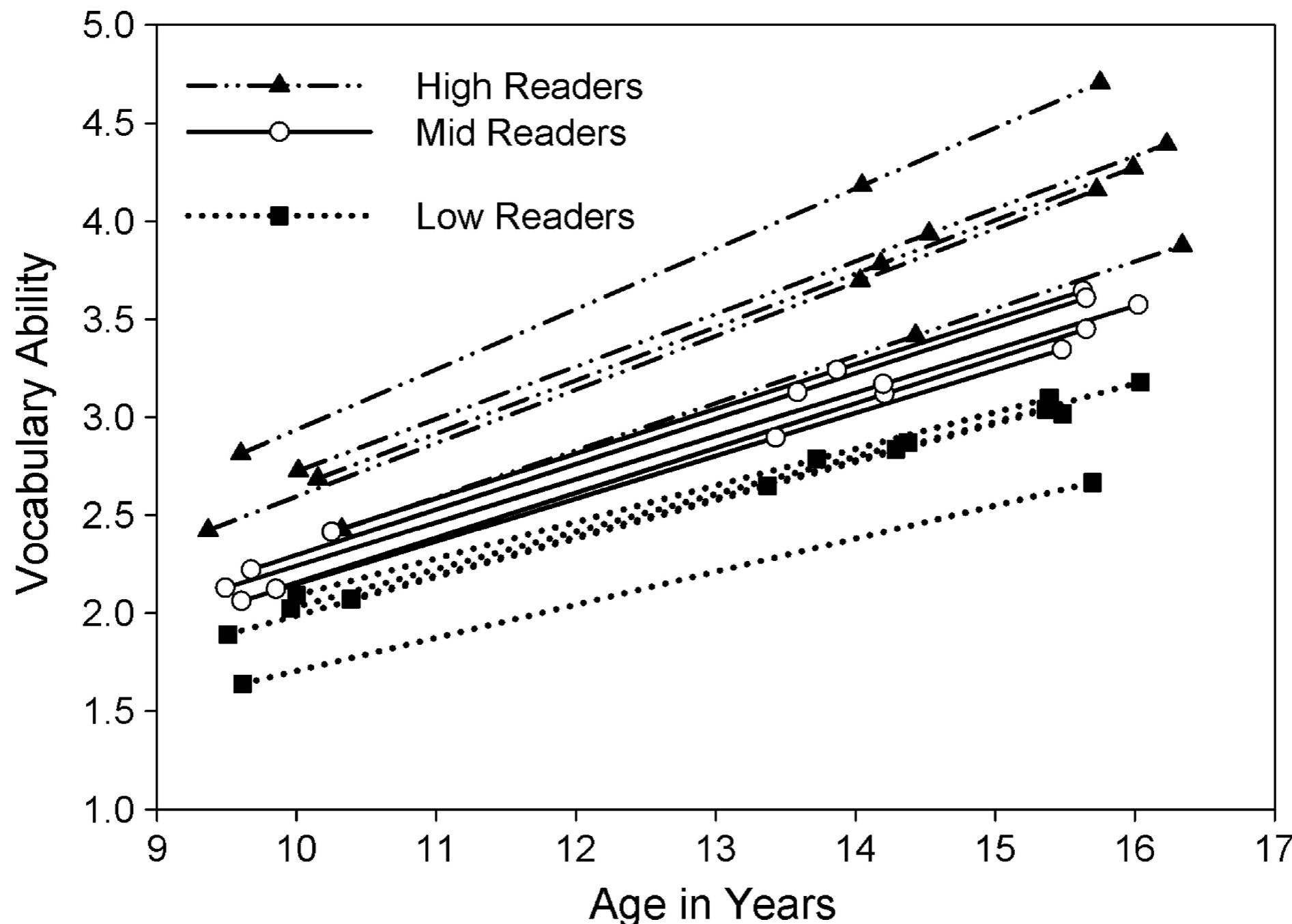
- Sets
- Nested Iteration
- Text Analysis: readability
 - contributing factors
 - measures

Lecture 13

What are some possible factors that influence the difficulty/complexity of a given piece of text?

Text Readability: Factors

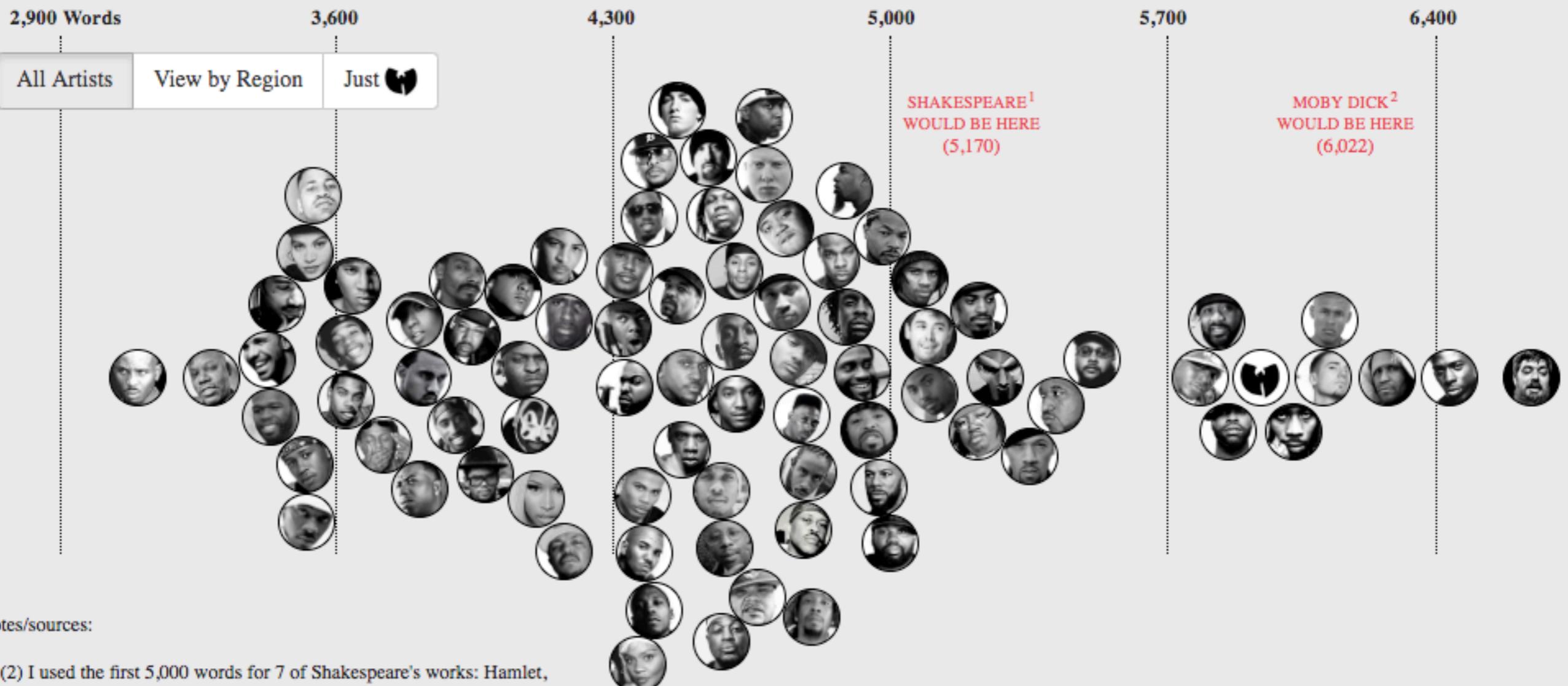
Vocabulary Size



Text Readability: Factors

Vocabulary Size

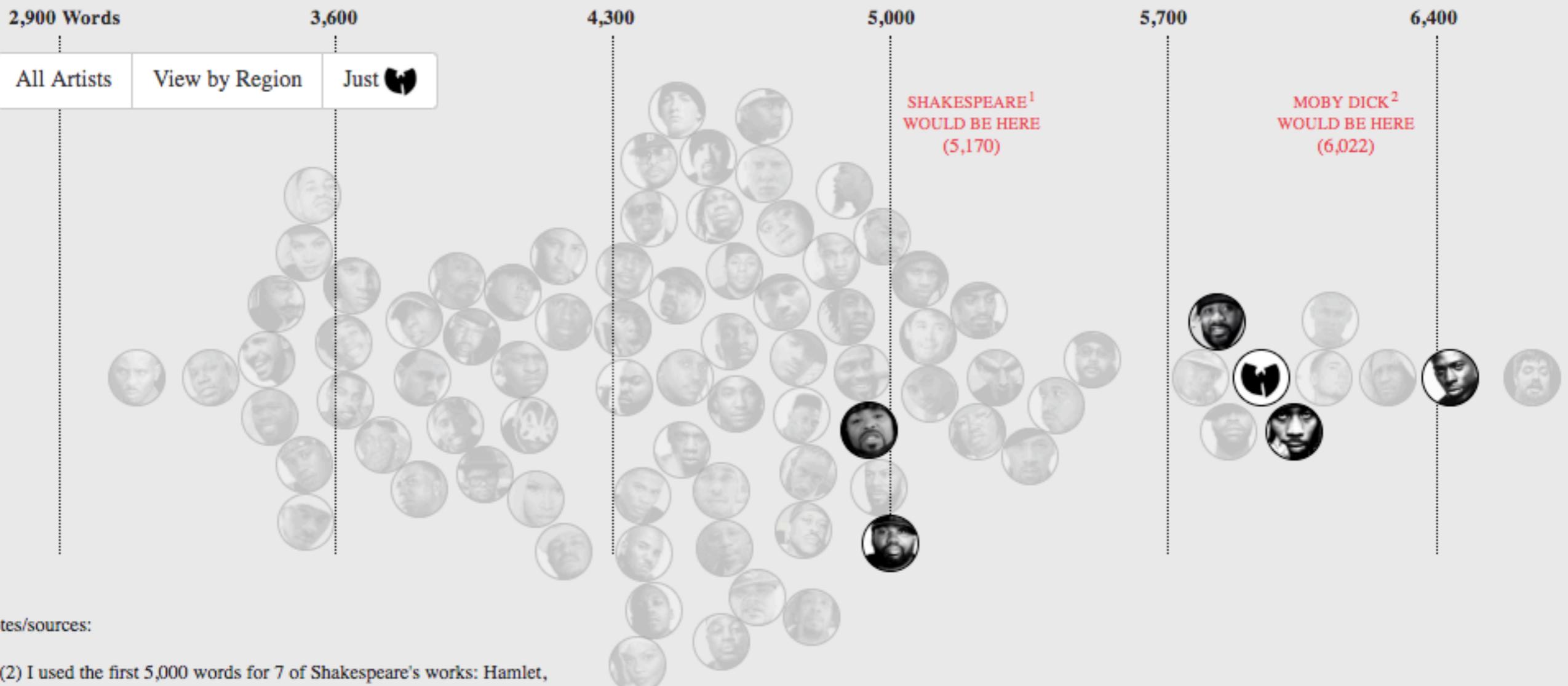
OF UNIQUE WORDS USED WITHIN ARTIST'S FIRST 35,000 LYRICS



Text Readability: Factors

Vocabulary Size

OF UNIQUE WORDS USED WITHIN ARTIST'S FIRST 35,000 LYRICS



Text Readability: Factors

A portrait painting of William Shakespeare, showing him from the chest up. He has dark hair and a beard. The background is dark and textured.

PBS NEWS HOUR

Menu

By –
Colleen
Shalby

0 comments

Shakespeare loses to the Wu-Tang Clan in vocabulary duel

<https://www.pbs.org/newshour/arts/data-scientist-pits-shakespeare-wu-tang-clan-battle-words>

Vocabulary Difficulty

Her antiquity in preceding and surviving succeeding tellurian generations: her nocturnal predominance: her satellitic dependence: her luminary reflection: her constancy under all her phases, rising and setting by her appointed times, waxing and waning: the forced invariability of her aspect: her indeterminate response to inaffirmative interrogation: her potency over effluent and refluent waters: her power to enamour, to mortify, to invest with beauty, to render insane, to incite to and aid delinquency: the tranquil inscrutability of her visage: the terribility of her isolated dominant resplendent propinquity: her omens of tempest and of calm: the stimulation of her light, her motion and her presence: the admonition of her craters, her arid seas, her silence: her splendour, when visible: her attraction, when invisible.

Text Readability: Factors

Sentence Length

God of heaven theres nothing like nature the wild mountains then the sea and the waves rushing then the beautiful country with the fields of oats and wheat and all kinds of things and all the fine cattle going about that would do your heart good to see rivers and lakes and flowers all sorts of shapes and smells and colours springing up even out of the ditches primroses and violets nature it is as for them saying theres no God I wouldnt give a snap of my two fingers for all their learning why dont they go and create something I often asked him atheists or whatever they call themselves go and wash the cobbles off themselves first then they go howling for the priest and they dying and why why because theyre afraid of hell on account of their bad conscience ah yes I know them well who was the first person in the universe before there was anybody that made it all who ah that they dont know neither do I so there you are they might as well try to stop the sun from rising tomorrow the sun shines for you he said the day we were lying among the rhododendrons on Howth head in the grey tweed suit and his straw hat the day I got him to propose to me yes first I gave him the bit of seedcake out of my mouth and it was leapyear like now yes 16 years ago my God after that long kiss I near lost my breath yes he said I was a flower of the mountain yes so we are flowers all a womans body yes that was one true thing he said in his life and the sun shines for you today yes that was why I liked him because I saw he understood or felt what a woman is and I knew I could always get round him and I gave him all the pleasure I could leading him on till he asked me to say yes and I wouldnt answer first only looked out over the sea and the sky I was thinking of so many things he didnt know of Mulvey and Mr Stanhope and Hester and father and old captain Groves and the sailors playing all birds fly and I say stoop and washing up dishes they called it on the pier and the sentry in front of the governors house with the thing round his white helmet poor devil half roasted and the Spanish girls laughing in their shawls and their tall combs and the auctions in the morning the Greeks and the jews and the Arabs and the devil knows who else from all the ends of Europe and Duke street and the fowl market all clucking outside Larby Sharons and the poor donkeys slipping half asleep and the vague fellows in the cloaks asleep in the shade on the steps and the big wheels of the carts of the bulls and the old castle thousands of years old yes and those handsome Moors all in white and turbans like kings asking you to sit down in their little bit of a shop and Ronda with the old windows of the posadas 2 glancing eyes a lattice hid for her lover to kiss the iron and the wineshops half open at night and the castanets and the night we missed the boat at Algeciras the watchman going about serene with his lamp and O that awful deepdown torrent O and the sea the sea crimson sometimes like fire and the glorious sunsets and the figtrees in the Alameda gardens yes and all the queer little streets and the pink and blue and yellow houses and the rosegardens and the jessamine and geraniums and cactuses and Gibraltar as a girl where I was a Flower of the mountain yes when I put the rose in my hair like the Andalusian girls used or shall I wear a red yes and how he kissed me under the Moorish wall and I thought well as well him as another and then I asked him with my eyes to ask again yes and then he asked me would I yes to say yes my mountain flower and first I put my arms around him yes and drew him down to me so he could feel my breasts all perfume yes and his heart was going like mad and yes I said yes I will Yes

James Joyce - Ulysses

Text Readability: Factors

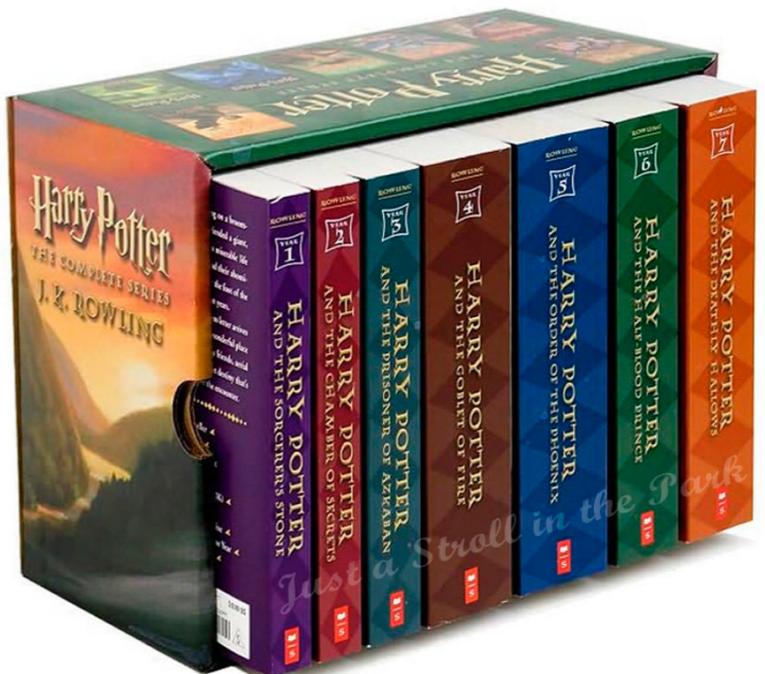
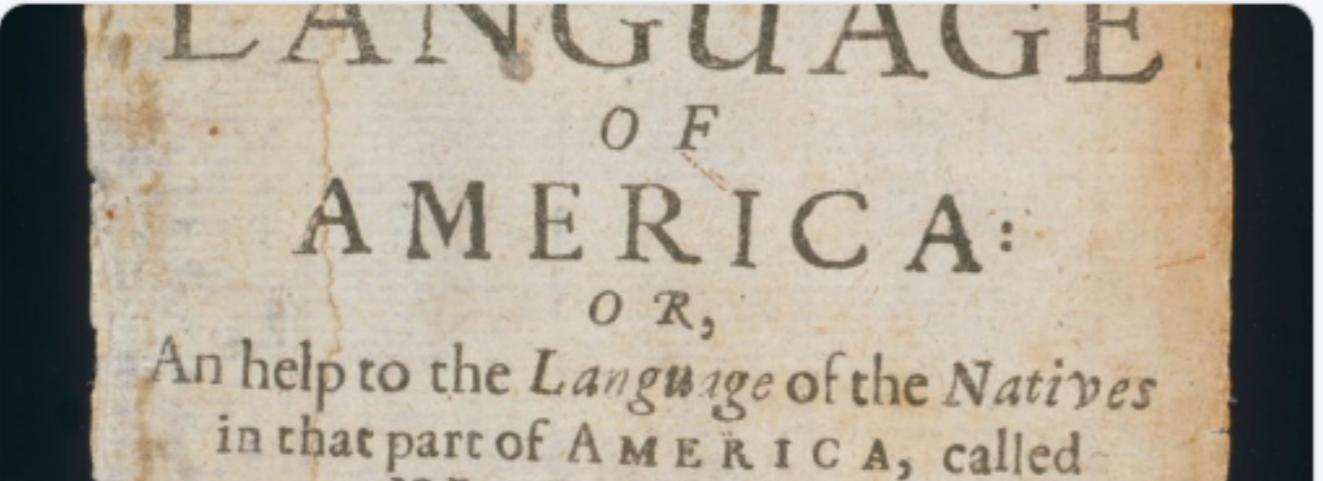
Text Length

GoProvidence Retweeted

Rhode Island History @RIHistory · Oct 16

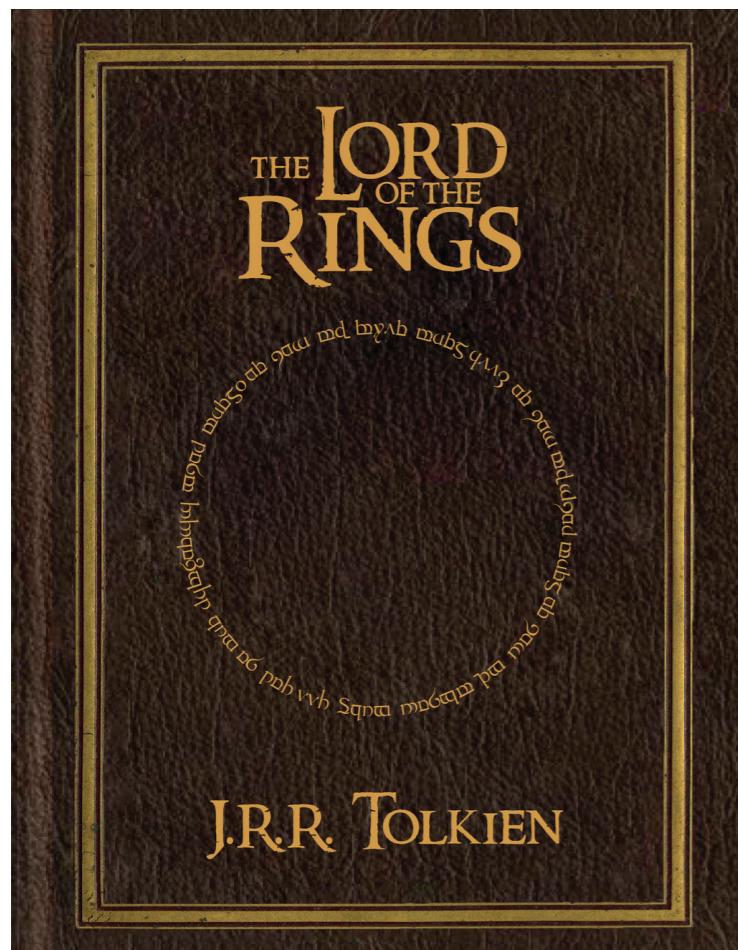
The RIHS is loaning our original 1643 copy of Roger Williams's *A Key Into the Language of America* to the wonderful @rowi1636 for their event on 10/20, & you're invited to come check it out!

Details here: bit.ly/2EshWB3.



Text Readability: Factors

Subject Matter



The Constitution of the United States of America (1787) – Full Text

Preamble

We the People of the United States, in Order to form a more perfect Union, establish justice, insure domestic Tranquility, provide for the common defense, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America.

Article I

[Click to view free lesson — Congress and the Constitution](#)

Section 1. All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

Lecture 13

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Text Readability

Flesch-Kincaid

$$0.39 \left(\frac{\text{total words}}{\text{total sentences}} \right) + 11.8 \left(\frac{\text{total syllables}}{\text{total words}} \right) - 15.59$$

- Output is a grade level
- Correlates very well with actual grade level comprehension
- Used very commonly
- Requires computing the number of syllables, which is hard to do very precisely

Text Readability

Dale-Chall

$$0.1579 \left(\frac{\text{difficult words}}{\text{words}} \times 100 \right) + 0.0496 \left(\frac{\text{words}}{\text{sentences}} \right)$$

- Includes a list of 3000 words that 4th graders could reliably understand
- Estimates the number of difficult words, by checking if words do not belong to the list of 'easy words'
- Even more reliable than Flesch-Kincaid, commonly used with modern scientific research

Text Readability

Coleman-Liau

$$\text{CLI} = 0.0588L - 0.296S - 15.8$$

L: Average number of letters per 100 words

S: Average number of sentences per 100 words

- Motivation: Counting syllables is difficult to generalize
- Breaks text into 100-word chunks
- Computes averages over these word-chunks

LAB TIME



AMERICAN KENNEL CLUB