

“Hey Computer- are you there?” Voice Recognition and Data Entry

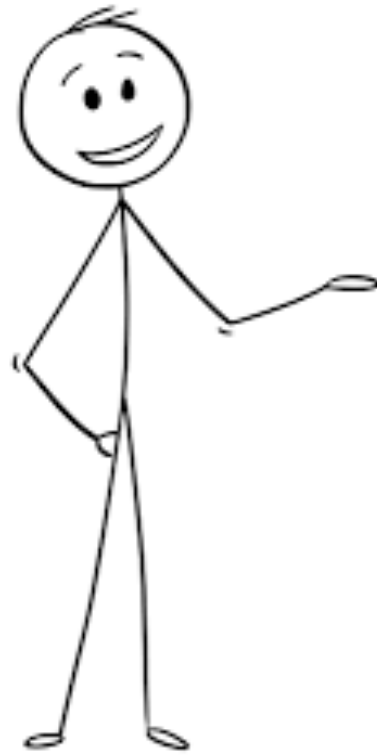
Yaa Kumah-Crystal, MD, MPH, MS

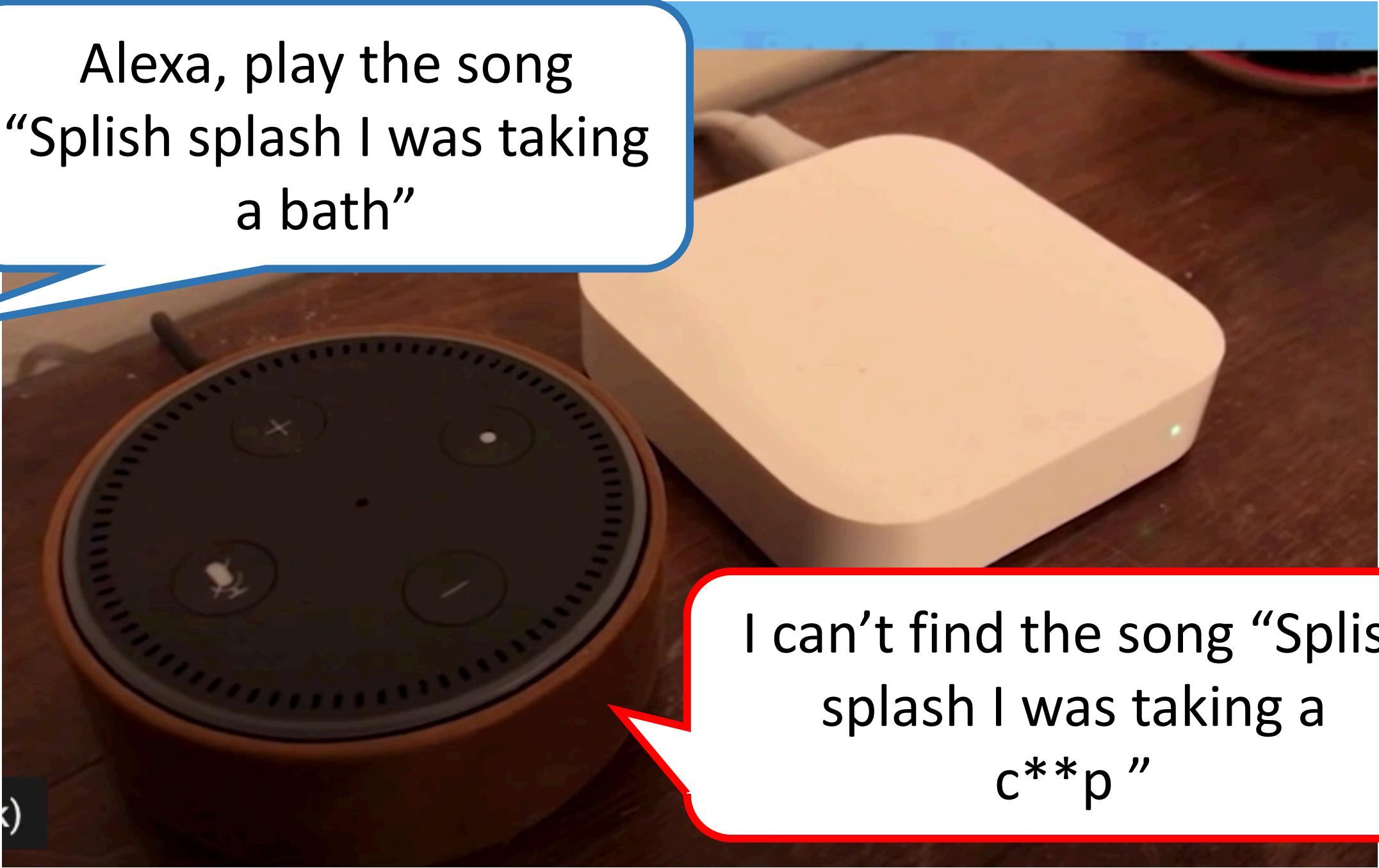


Disclosure

- Yaa Kumah-Crystal MD, MPH
- Discloses the following relevant relationship with commercial interests:
 - Research partnership with Nuance Communications
 - Use of NLP libraries for research and development

Reflect: has this ever happened to you?





Alexa, play the song
“Splish splash I was taking
a bath”

I can't find the song “Splish
splash I was taking a
c**p ”

Dictation

- Transcription of spoken word
- Front End
 - Real-time speech recognition software
- Back End
 - Recording captured, medical transcriptionist
- Automatic Speech Recognition

Why Speak? Faster

Speech

~150

WPM

Writing

~13

WPM

Typing

~40

WPM



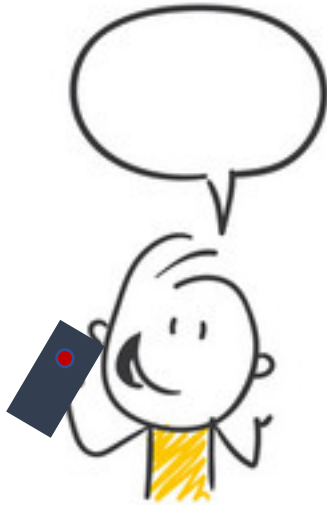
Why not speak



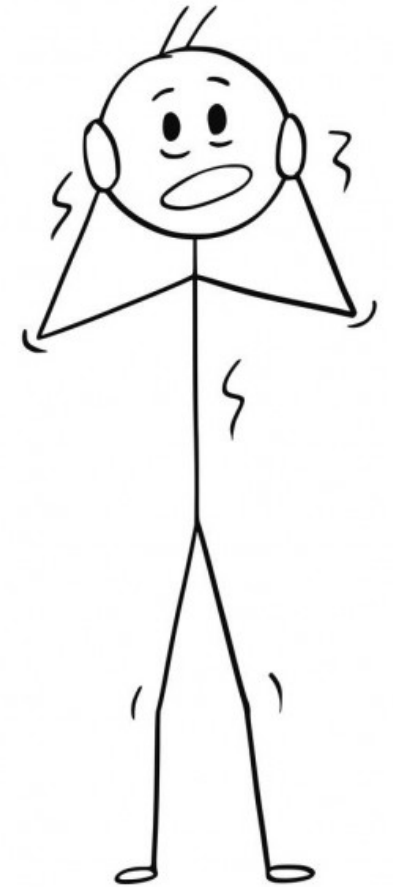
“History of sick as hell disease”



April 4th

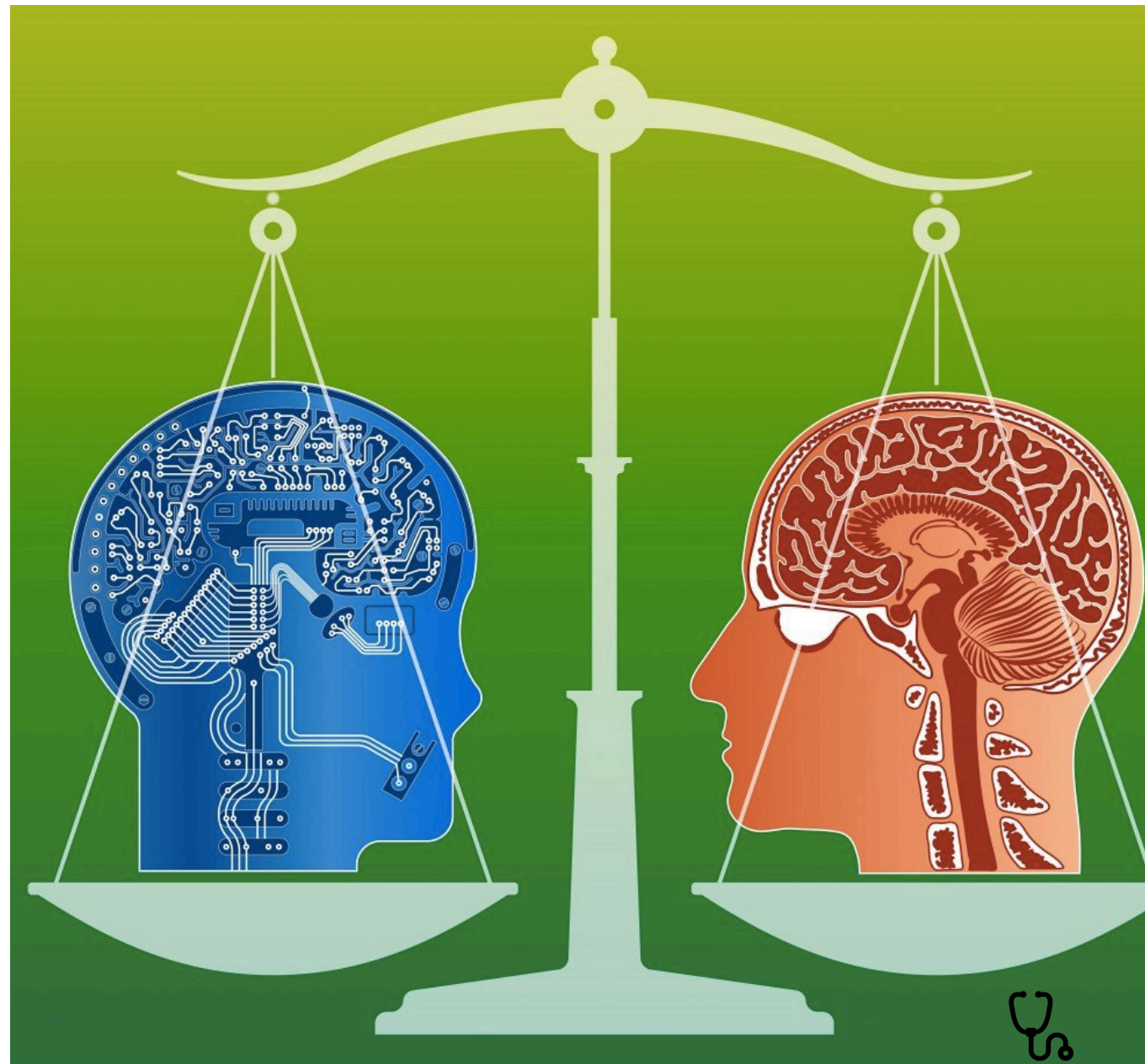


“History of sickle cell disease”



NLP Recognition on Parity with Human

- Human error rate of transcribe conversational speech over the telephone human ~5%
- August 2016 Microsoft announced they beat human error rate of 5.1%
- SWITCHBOARD, CallHome, NIST corpus
 - recorded conversations between humans, day-to-day topics (buying a car)



Context: Homophones

“Fasting study” → “Vaccine study”

“hyperglycemia” → “hypercalcemia”

“inadequate” → “an adequate”

Zhou. Analysis of Errors in Dictated Clinical Documents Assisted by Speech Recognition Software and Professional Transcriptionists: JAMA 2018

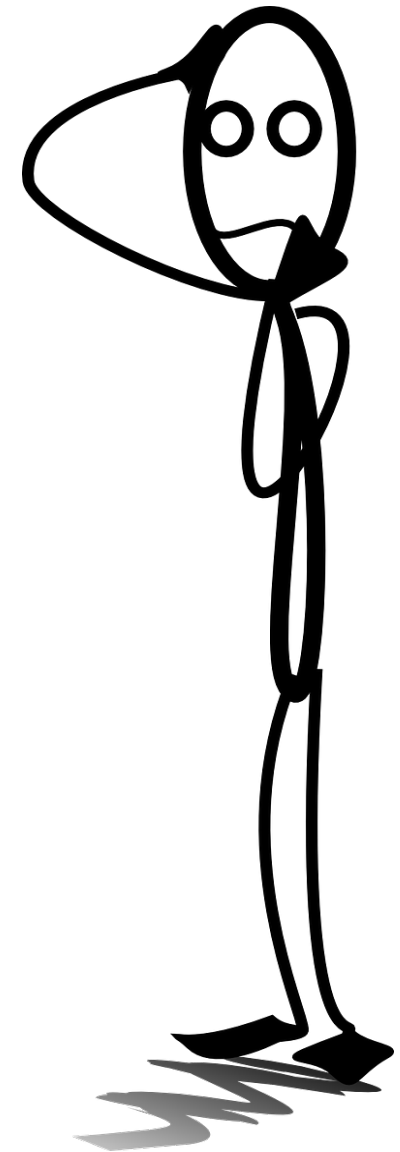
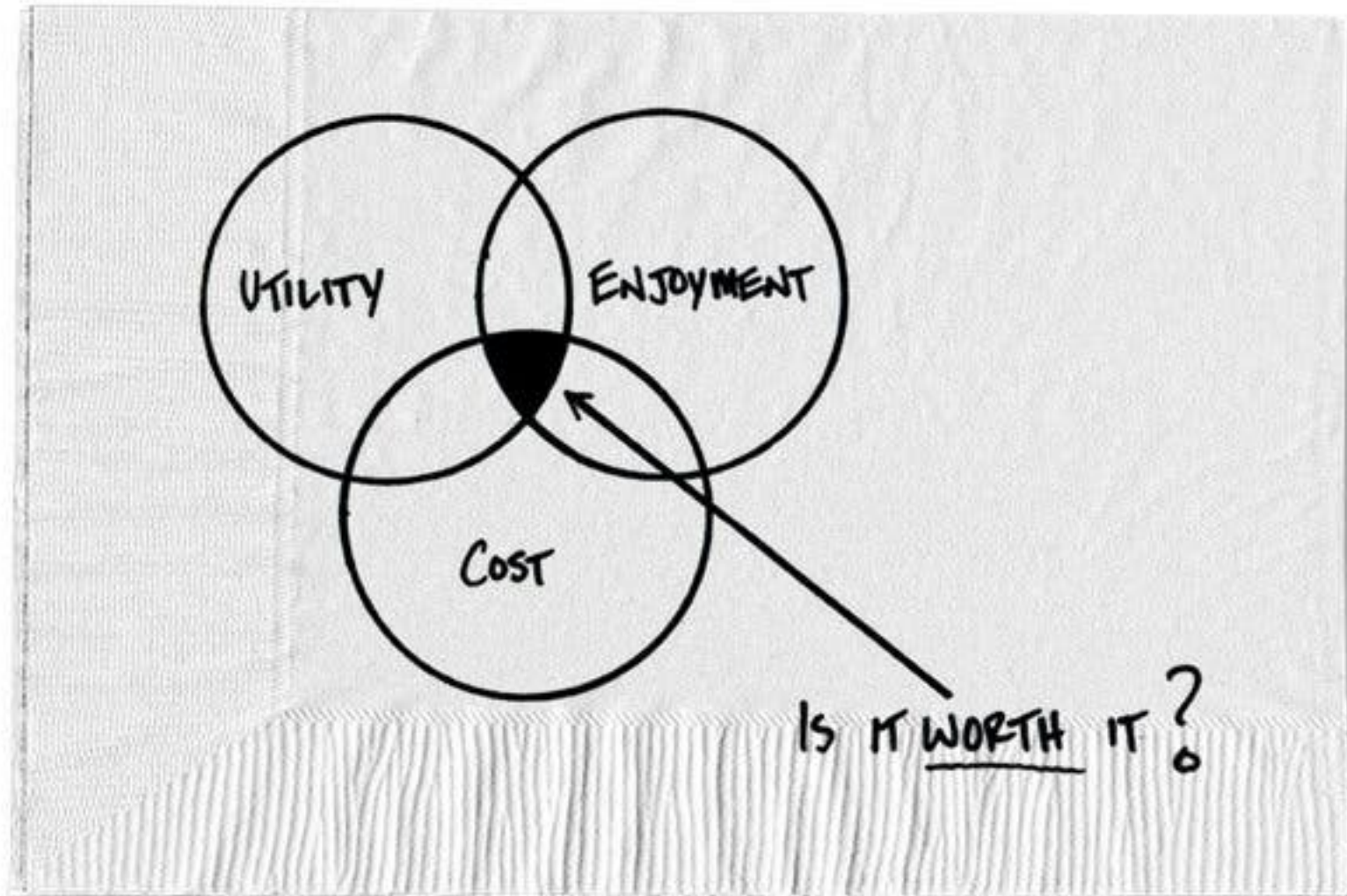
“inadequate evaluation to exclude neoplasia”

“adequate evaluation to exclude neoplasia”

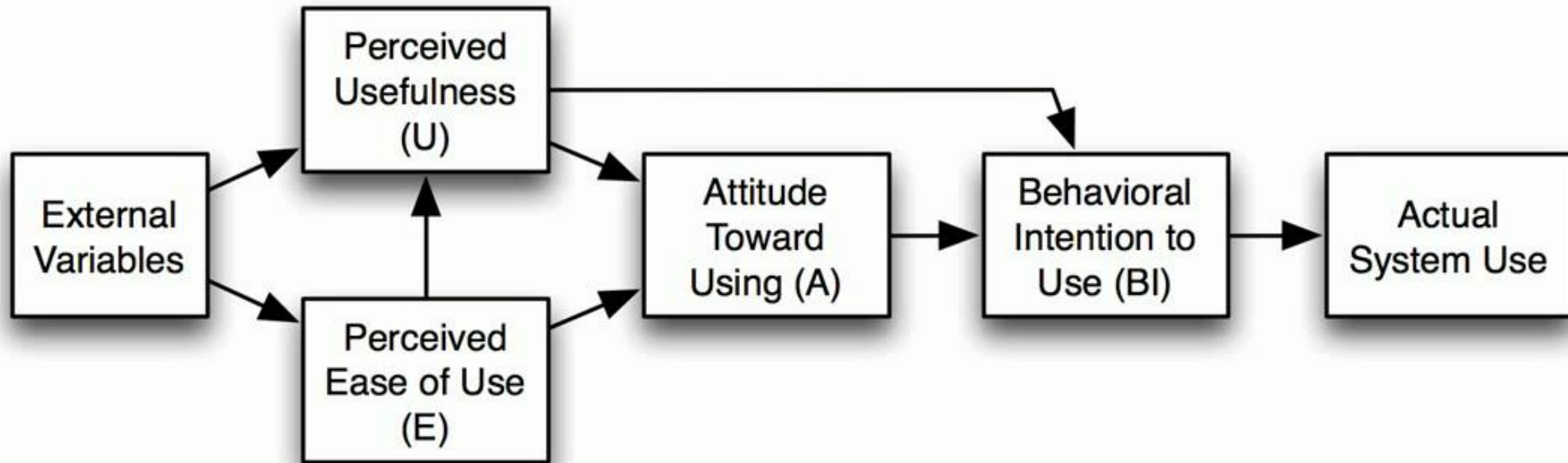
Errors

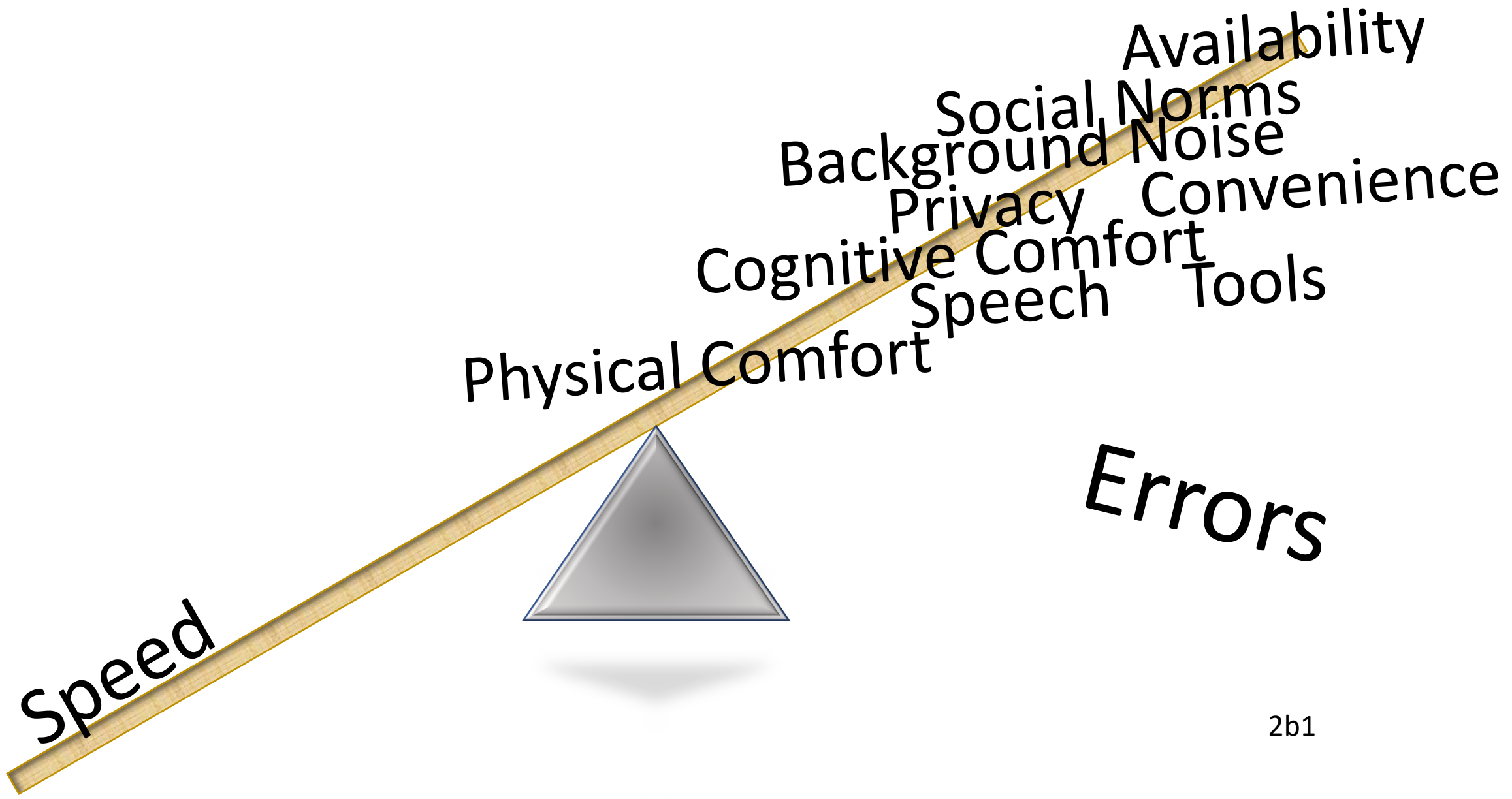
- **Analysis of Errors in Dictated Clinical Documents Assisted by Speech Recognition Software and Professional Transcriptionists: JAMA 2018**
- 217 clinical notes
- Average error rate 7.4%
- 20.3% of those errors pertained to clinical information
 - remaining errors were simple grammar, word mistakes
- The most general types of mistake
 - deleting words (34.7%)
 - inserting (27%)
- Revision: the error rate dropped to 0.4%
- Negligible variance between physicians of different genders or specialties

Is it worth it?



Technology acceptance model





Summary

- Voice is quick and intuitive
- Environmental and Technical limitations
- Weights of each variable vary per individual
- Weights of each variable vary in the same person per situation
- Context matters