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Sandia Academic Alliance Fall 2021 University of Illinois LDRD Virtual Poster Session

Assessing Eye Movement Scanpaths in Source Code Comprehension

Jack Dempsey (PhD Candidate in Educational Psychology), Anna Tsiola (PhD, Linguistics), Mallory Stites (PI, Sandia, Cognitive Science & Systems), Nigel Bosch (Co-PI, Educational Psychology), & Kiel Christianson (Co-PI, Educational Psychology)

Motivation

- Psycholinguistic approach to assessing real-time processes during reading and troubleshooting of Python code

Research Questions

- **What are physiological signatures of reading code and how do they differ from reading text?**
- **What types of feedback best help programmers troubleshoot?**
- **How can these data inform educational interventions?**

Methodology

Multiple measures of reading behavior: individual fixations, aggregate (re)reading, scanpaths

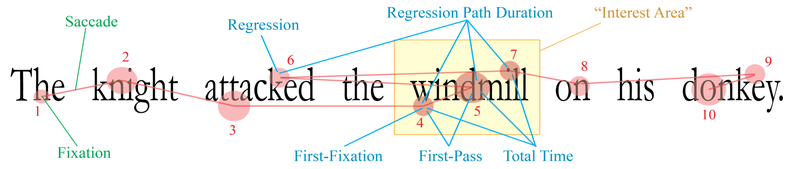


Photo Credit: Kertz Lab – Brown University https://www.icge.co.uk/languagesciencesblog/?p=1216

Eye-Mind Link: Where eyes look linked to attentional processes

Link physiological processes to cognitive/neural strategies and mechanisms underlying comprehension

Design

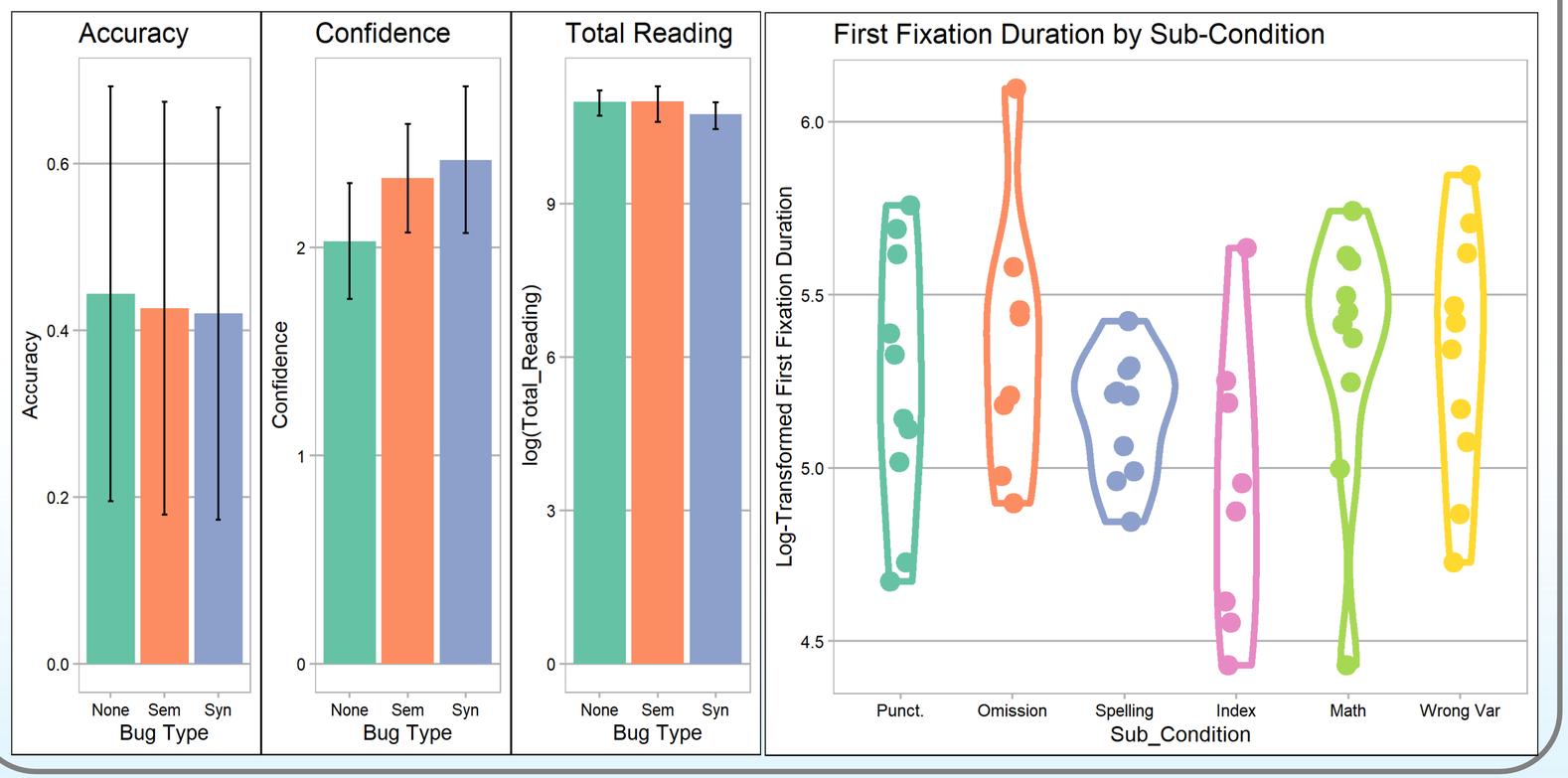
Participants -- n=30-40 (Preliminary n=4)
Experienced Python Programmers (College, UIUC)

Task
Read through function and determine whether:

- Code will work
- Code will produce incorrect result
- Code will produce runtime error

	Syntactic	Semantic
Bug	`minimum = min(num1:num2)`	`rev_order.append(word[-(i)])`
No Bug	`minimum = min(num1, num2)`	`rev_order.append(word[-(i+1)])`

Preliminary Data



Challenges

Recruitment during COVID → Not easy, even when successful

Balancing ability to generalize with experimental control

Large variability between participants and by experience

Next Steps

Continue data collection for initial experiment

Understanding processes involved in source code comprehension:

- Role of rereading
- Impact of various error feedback systems
- Impact of first language (English vs. non-English)

Applying this understanding:

- Developing better error feedback systems
- Developing educational interventions

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