Task Complexity Effects on L2 Writing Processes and Correlations with Text Features

Bryan Koronkiewicz[1], Rosa M. Manchón[2], Aitor Garcés-Manzanera[2], Olena Vasylets[3], & Judit Kormos[4,5]

[1]University of Alabama | [2]Universidad de Murcia | [3]Universitat de Barcelona | [4]Lancaster University | [5]University of Ljubljana

AAAL 2026 | Chicago, Illinois

Introduction

- Task complexity (TC) research has focused heavily on L2 learners' **speaking**
- However, **writing** is a distinct, complex and cognitively demanding process
- With TC and L2 writing, the **products** have been central to prior research
- Far less is known about the cognitive **processes** L2 writers engage in when placed under different TC conditions
  - Persistent uncertainty about how learners respond to different TC variables (Sasayama et al., 2025)
  - Call for research on attention allocation across writing processes under varying TC variables (Jung & Wang, 2025)

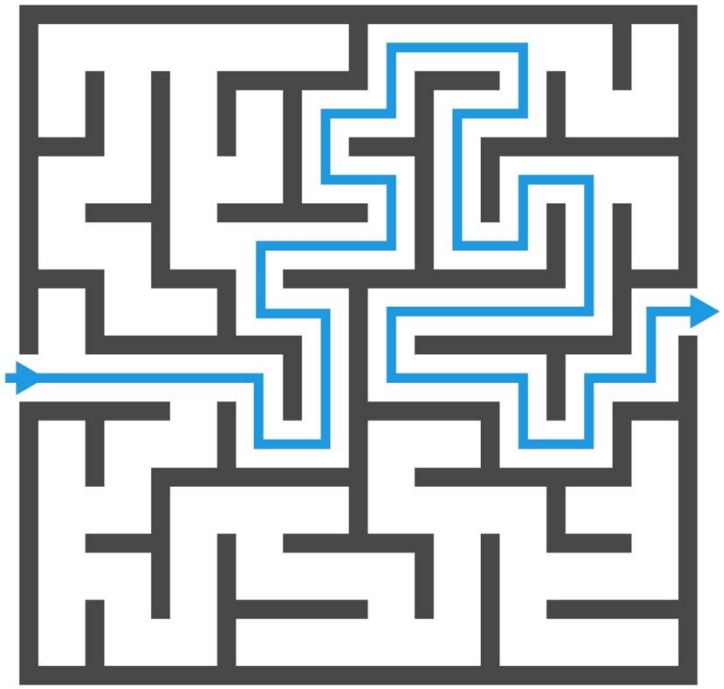
Why It Matters

For theory: Validating how TC affects the L2 writing process builds on existing research exploring whether leading TC models (Robinson, 2001, 2011; Skehan, 1998; Xu & Zhang, 2025) or cognitive load models (Sweller et al., 2019) can effectively explain L2 writing behavior

For practice: Writing tasks varying in complexity are used routinely in L2 classrooms and assessments, yet we're making decisions about them without fully understanding what they actually demand of L2 writers cognitively and, in turn, how it affects language learning and/or use

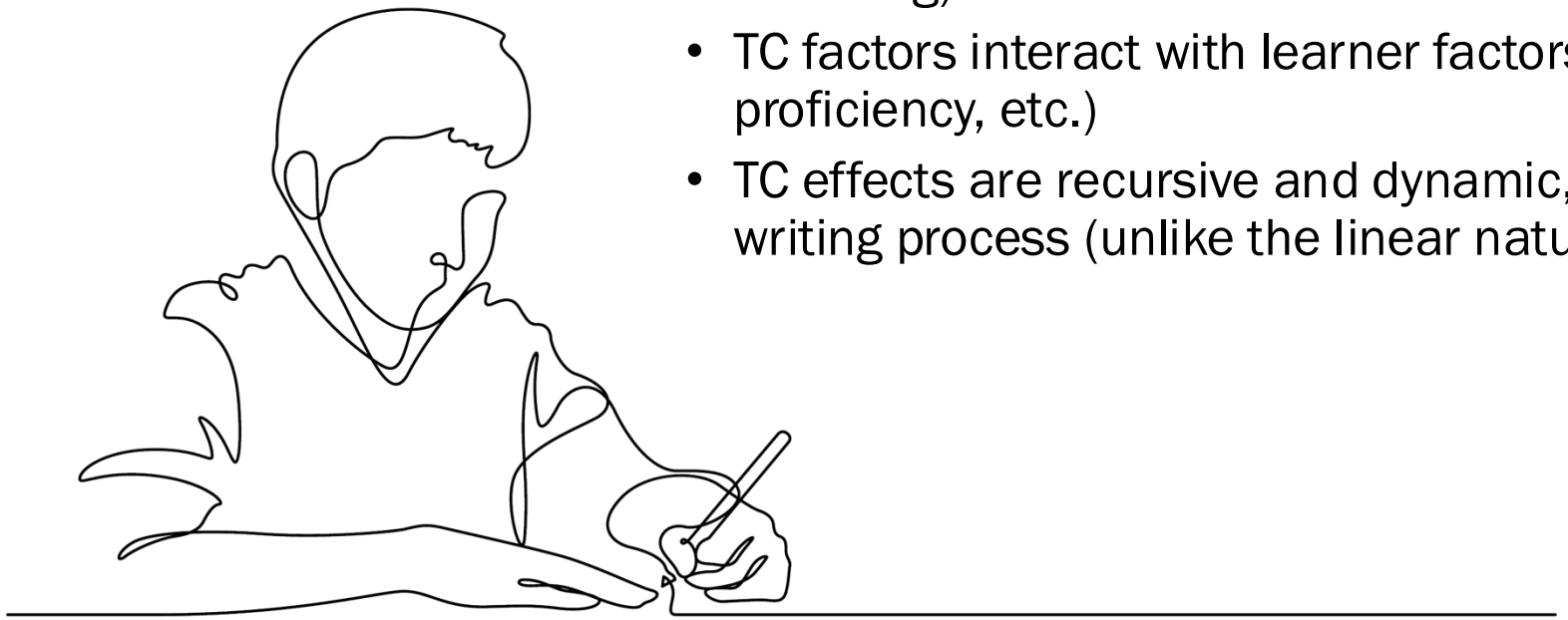
THEORETICAL BACKGROUND

- TC research draws on L1 writing models (Hayes, 1996; Kellog, 1996), combined with SLA frameworks:
  - **Skehan's (1998) Limited Attentional Capacity Model:** Attention is finite; increased complexity results in a trade off of resources
  - **Robinson's (2001, 2011) Cognition Hypothesis:** Complexity can increase engagement by directing attention, and result in improved performance
  - However, both developed with oral production in mind
- Models of cognitive load from educational psychology
  - **Sweller et al.'s (2019) Cognitive Load Theory:** Intrinsic load is not fixed but varies with learner expertise



Theoretical Background

- **Xu and Zhang's (2025) Model of Cognitive Task Complexity in L2 Writing:**
  - Integrates Kellogg's (1996) model of writing processes with the SLA-rooted TC frameworks mentioned previously
  - Model features worth highlighting:
    - TC is inherent in the formulation stage (i.e., during linguistic encoding)
    - TC factors interact with learner factors (e.g., cognitive abilities, proficiency, etc.)
    - TC effects are recursive and dynamic, rippling through the entire writing process (unlike the linear nature of speaking)



Operationalizing TC in Process-Oriented Research

	DESCRIPTION	LESS COMPLEX		MORE COMPLEX	STUDIES
TASK CONDITION	Planning time	+ **time**		- **time**	Ong (2014)
TASK SUPPORT	Content support (i.e., ideas to include)	+ **support**		- **support**	Ong (2014) Révész et al. (2017) Jung (2020)
	Combinations of support	**topic + ideas + macro-structure**	**topic + ideas**	**topic only**	Ong (2014)
TASK DEMANDS	Number of elements and reasoning demands	- **elements** - **reasoning**		+ **elements** + **reasoning**	Xu et al. (2021) Abdi Tabari & Lee (2024)
	Amount of information to process	- **information**		+ **information**	Rong & Révész (2025)
TASK TYPE	Independent vs. integrated tasks	**Independent argumentative task designed to be simple**		**Integrated reading-to-write task designed to be complex**	Michel et al. (2020)

TC Effects on On-line Writing Behaviors

- Research on TC via content support yields mixed findings, but differing outcome measures between studies make direct comparison difficult
- **Révész et al. (2017):** No content support → Fewer pauses and greater revision, leading to improved text quality
- **Jung (2020):** No content support → Greater task demands, but minimal effects on pausing, revision, or text quality
- **Abdi Tabari and Lee (2024):** Both L1 and L2 writers were more fluent on simpler tasks, especially L1 writers

TC Effects on Macro-writing Processes

- In general, content support frees cognitive resources for idea generation, organization, and linguistic encoding (Yung, 2014; Ong, 2014; Révész et al., 2017)
  - As does content scaffolding (Ong, 2014) and fewer source texts (Rong & Révész, 2025)
- TC can reshape *when* processes occur more so than whether they occur (Michel et al., 2020)
- Mixed findings on whether integrated tasks show no difference in overall macro-writing engagement (Michel et al., 2020) or higher cognitive demands (Abdi Tabari & Lee, 2025)

PRESENT STUDY

- **Goal:** Examine TC effects (operationalized as ±content support) on L2 writers' processing activity
- **Replicated from prior studies:** Advanced proficiency participants, argumentative essay task, outcome measures that are a triangulation of keystroke, CAF, and post-task questionnaire data
- **Novel methodological additions:**
  - Two tasks and two prompts per TC condition to avoid task-repetition and order effects
  - Reduced task time to increase cognitive demands for advanced-level participants
  - Analysis of temporal distribution of writing processes

RESEARCH QUESTIONS

RQ1: To what extent does TC (± content support) affect L2 writers' **pausing and revision behavior**, overall and across three time intervals?

RQ2: To what extent does TC affect **text features** (lexical diversity, syntactic complexity, accuracy, fluency)?

RQ3: What **associations** exist **between writing processes and text features** under simple vs. complex task conditions?

Methods: Participants

- N = 45 university students
  - Advanced L2 English users (B2-C1; OPT *M* = 82.84)
  - L1: Spanish (*n* = 42)
  - Gender: female (*n* = 32), male (*n* = 13)

- Participation was voluntary and compensated with course credit
- Within-participants design: Each participant completed both a simple and a complex task

Methods: Design

- TC operationalization: +/− content support
  - **Simple:** topic + 6 idea cues (asked to develop 4)
  - **Complex:** topic only (writers generate and organize their own arguments)
- Two prompts (presented in Spanish), counterbalanced via Latin square
  - Group A: Prompt 1 + Simple Break Prompt 2 + Complex
  - Group B: Prompt 1 + Complex Break Prompt 2 + Simple
  - Group C: Prompt 2 + Simple Break Prompt 1 + Complex
  - Group D: Prompt 2 + Complex Break Prompt 1 + Simple
- Time-compressed task for each prompt: 30 minutes, 200-250 words
- Tools: Inputlog 9.5 (keystroke logging) + post-task questionnaire

COMPLEX

PROMPT 1

Should employers be able contact their staff at all times, even on holidays? Discuss both sides of this question and give your opinion.

PROMPT 2

Some people think first impressions of someone are important, while others think we should not judge another person so quickly and should take time to know them better. Discuss both sides and give your opinion.

SIMPLE

The following bullet-points contain specific ideas you might consider for your essay. Please choose four of these six ideas and elaborate them.

- Right to have a rest and disconnect from work
- Maintaining work-life balance
- Impact on job satisfaction
- Certain jobs require 24-hour availability
- Quick reaction to emergencies in the work place
- Keeping up competitiveness of the business/company

The following bullet-points contain specific ideas you might consider for your essay. Please choose four of these six ideas and elaborate them.

- Human brain is prone to make quick judgements
- First impressions can have a lasting effect
- Body language and facial expression carry important information
- Stereo-types and bias can influence initial judgements
- Knowing someone well takes time
- People are complex and change over time

Methods: Measures

PROCESS (RQ 1 + RQ3)

- **On-line writing behaviors (keystroke logging)**
  - Pausing: total pauses, pausing time, pauses/min, pauses/100 words, pause location (within-word, between-word, sentence, paragraph)
  - Revision: total revisions, burst frequency, characters per burst, product-process ratio
  - Analyzed across 3 equal time intervals (Int1/Int2/Int3)
- **Macro-writing processes (post-task questionnaire)**
  - Perceived difficulty, mental effort, organization, lexical/grammatical demands
  - Self-reported frequency of pre-, during-, and post-writing activities

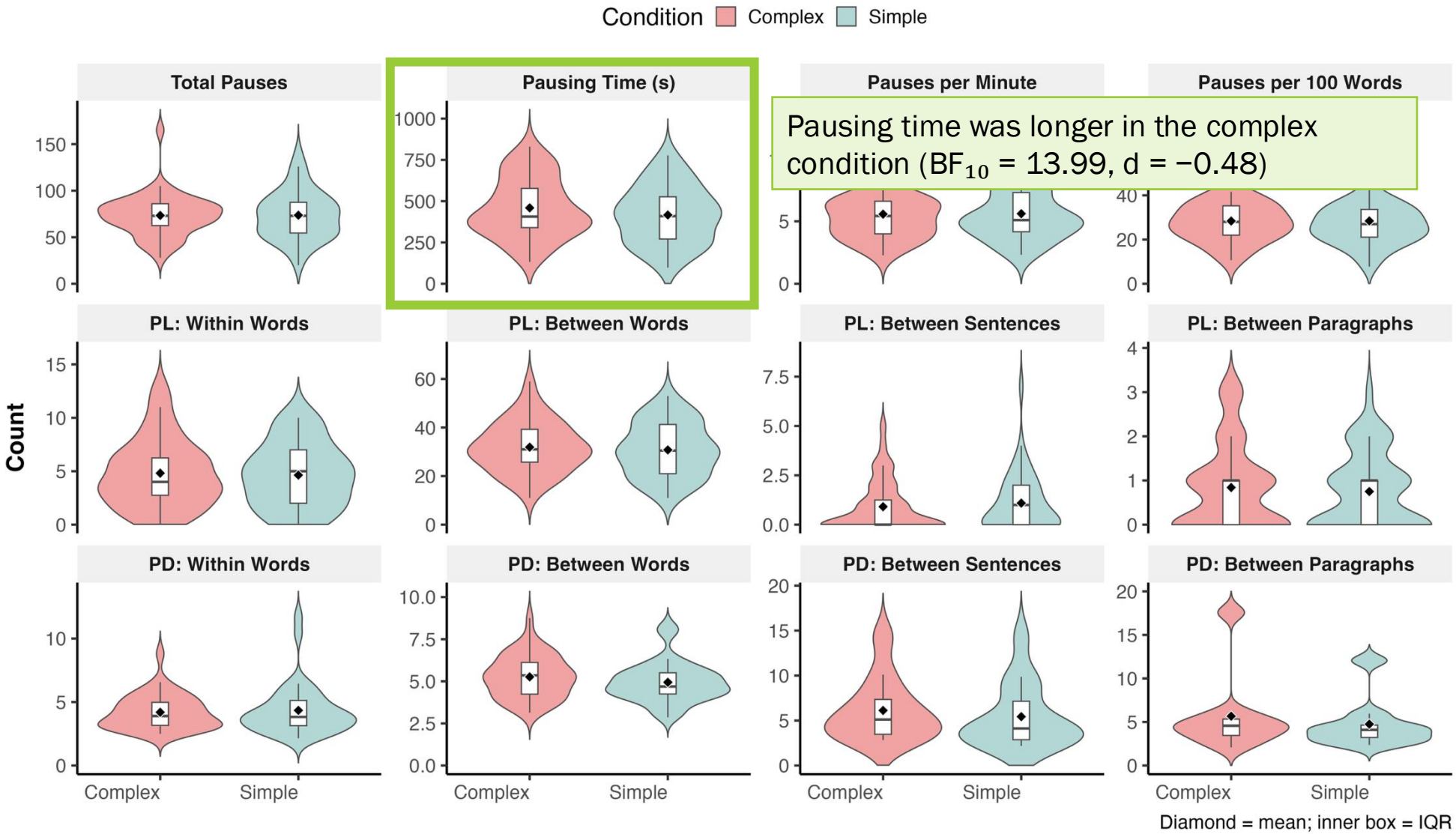
PRODUCT (RQ2 + RQ3)

- **Text features (CAF)**
  - Lexical diversity: Guiraud's Index, vocd-D
  - Syntactic complexity: dependent clauses, clause ratio, T-unit length
  - Accuracy: grammar/vocabulary errors per 100 tokens
  - Fluency: words per minute

RESULTS: Pausing and Revision Behavior

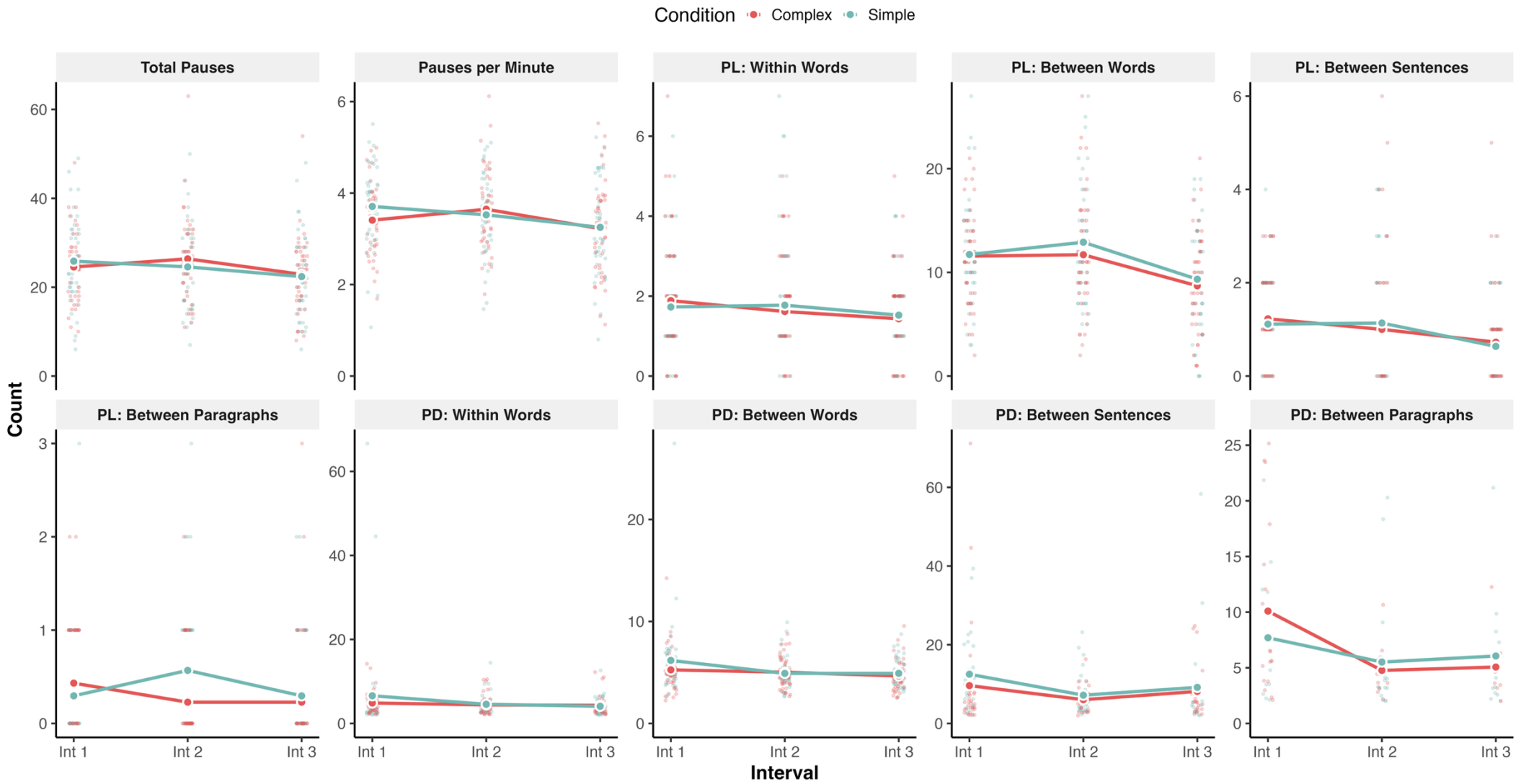
Research Question 1

Results: Overall Pausing



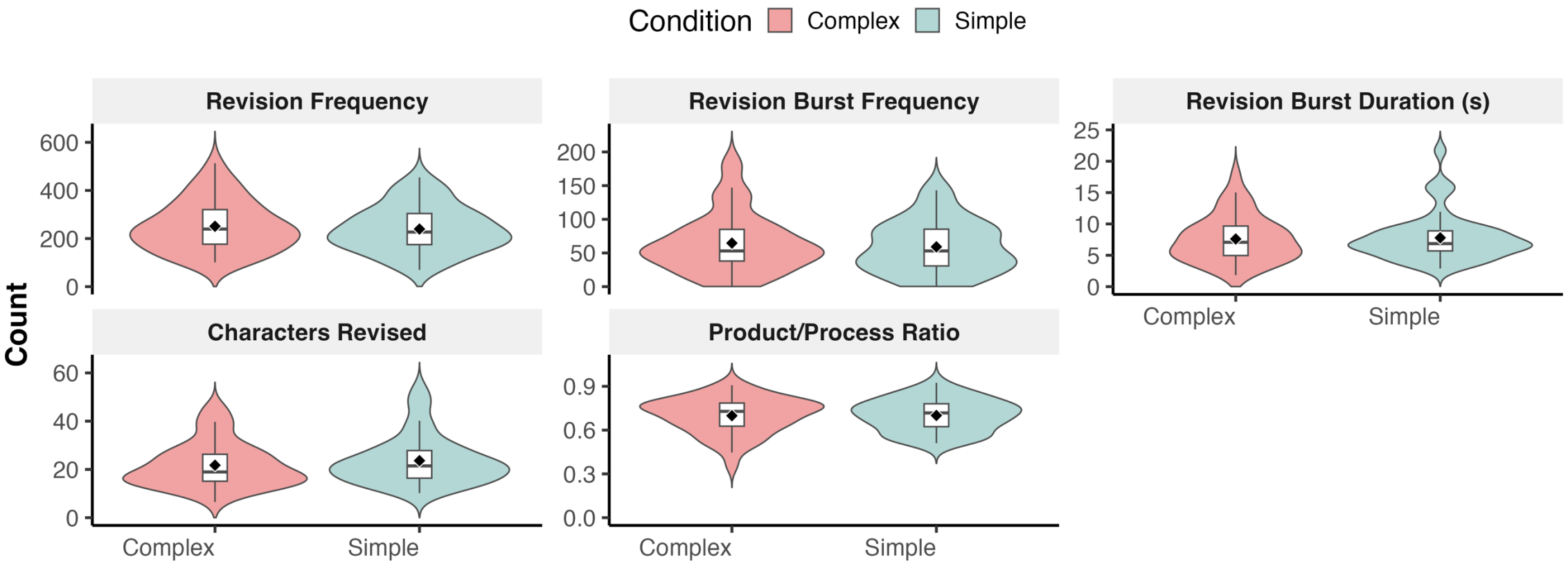
Pausing time was longer in the complex condition (BF_{10} = 13.99, d = −0.48)

Results: Pausing by Interval



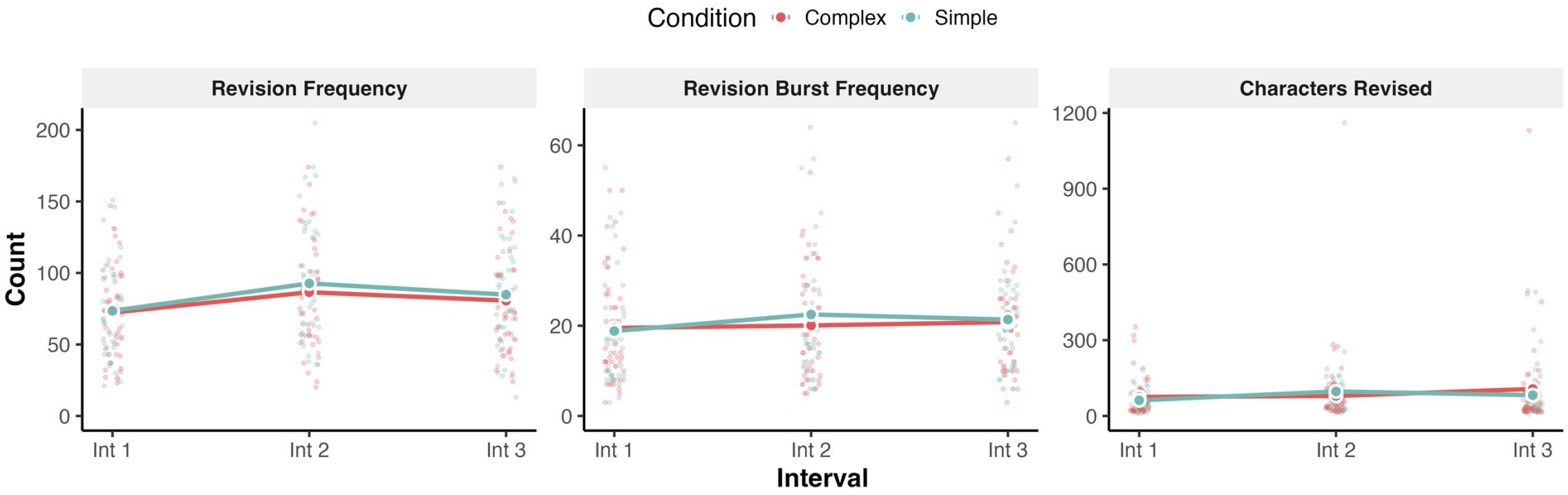
Bold line = condition mean; points = individual observations

Results: Overall Revisions



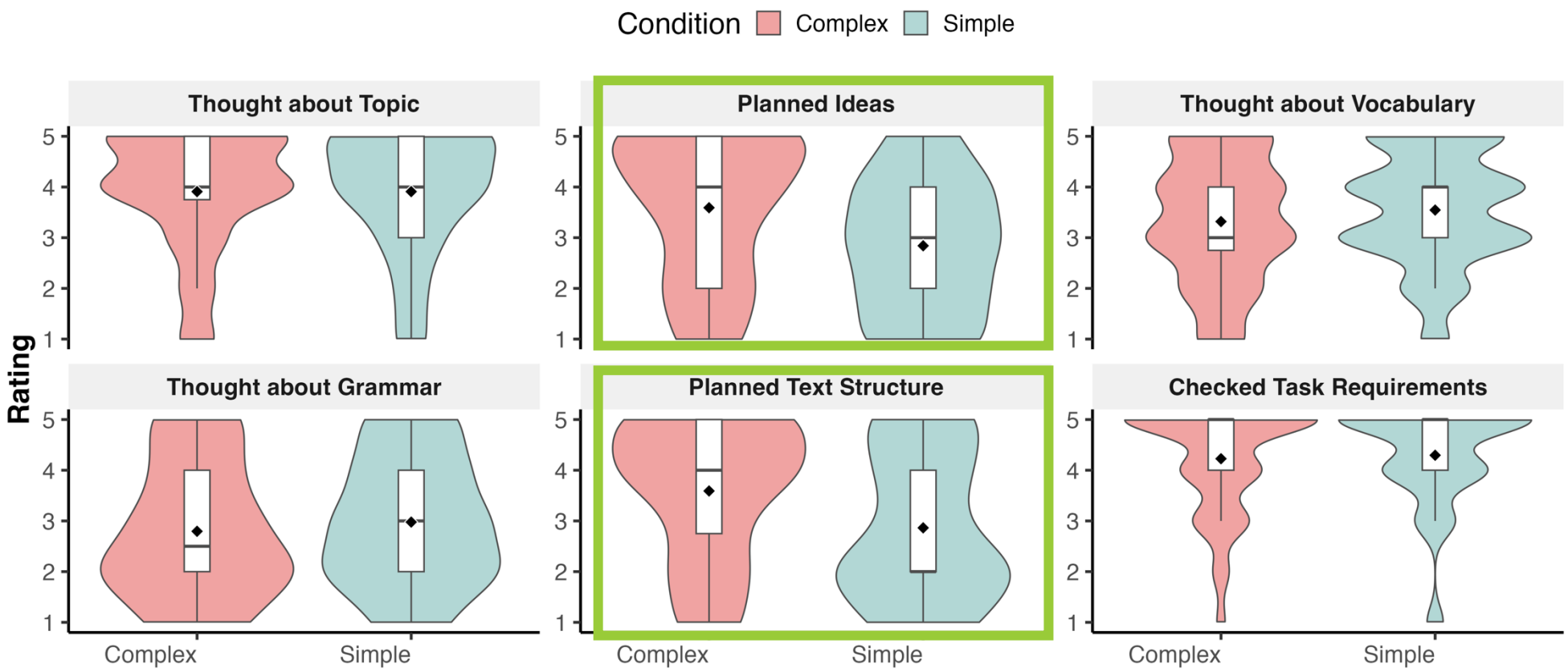
Diamond = mean; inner box = IQR

Results: Revisions by Interval



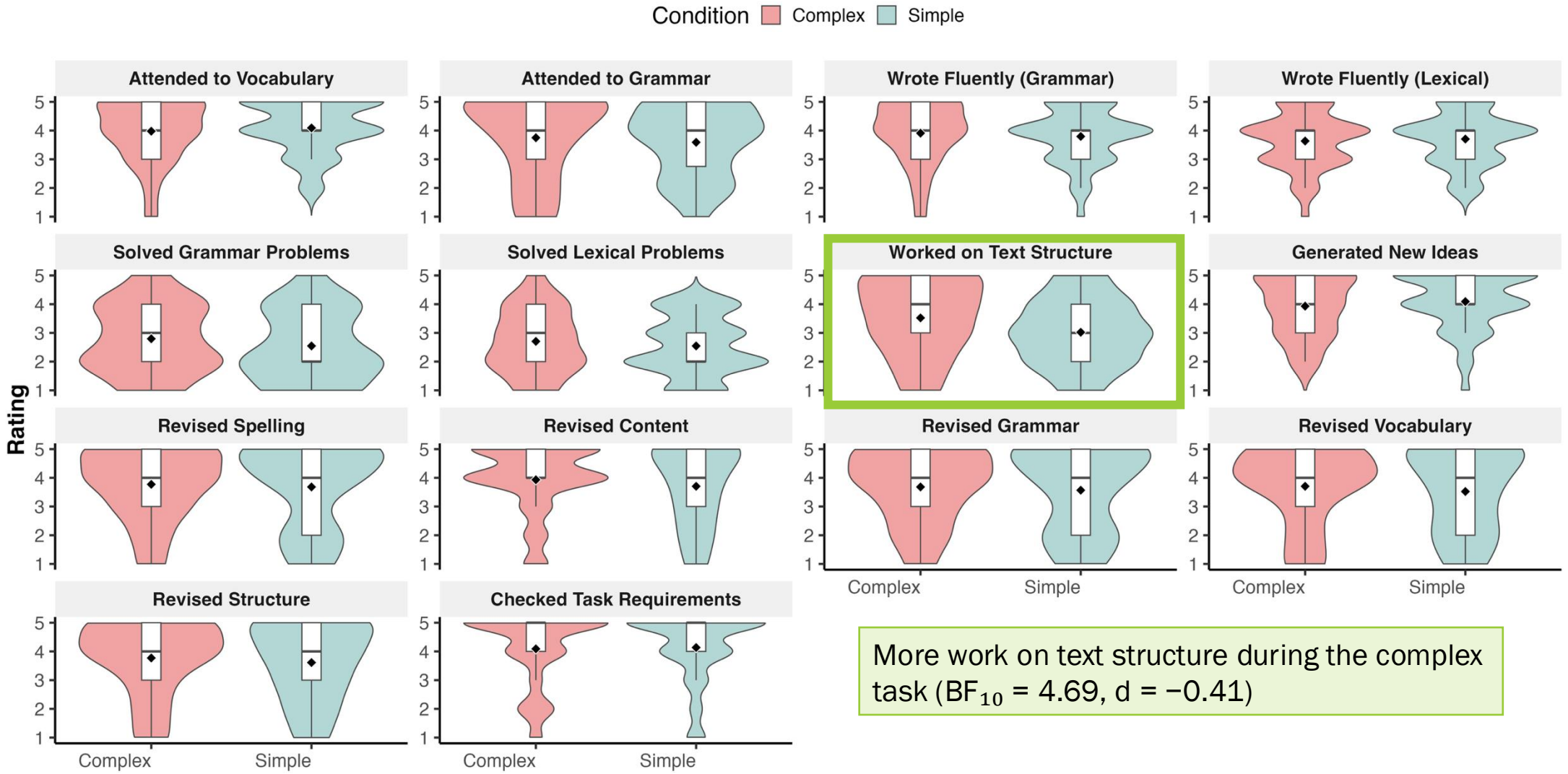
Bold line = condition mean; points = individual observations

Results: Pre-Writing



More planning of ideas (BF_{10} = 22.24, d = −0.50) and text structure (BF_{10} = 6.51, d = −0.43) in the complex condition

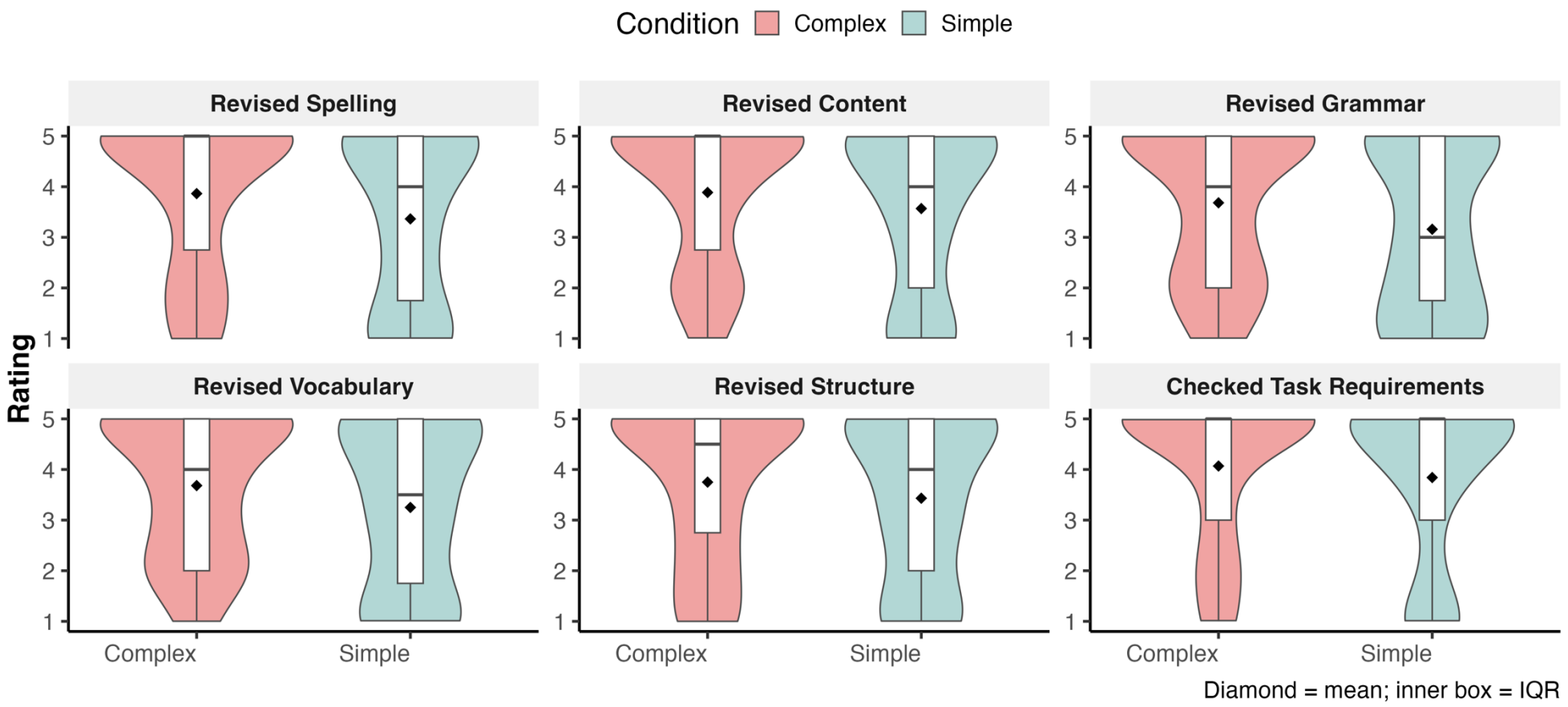
Results: While Writing



More work on text structure during the complex task (BF_{10} = 4.69, d = −0.41)

Diamond = mean; inner box = IQR

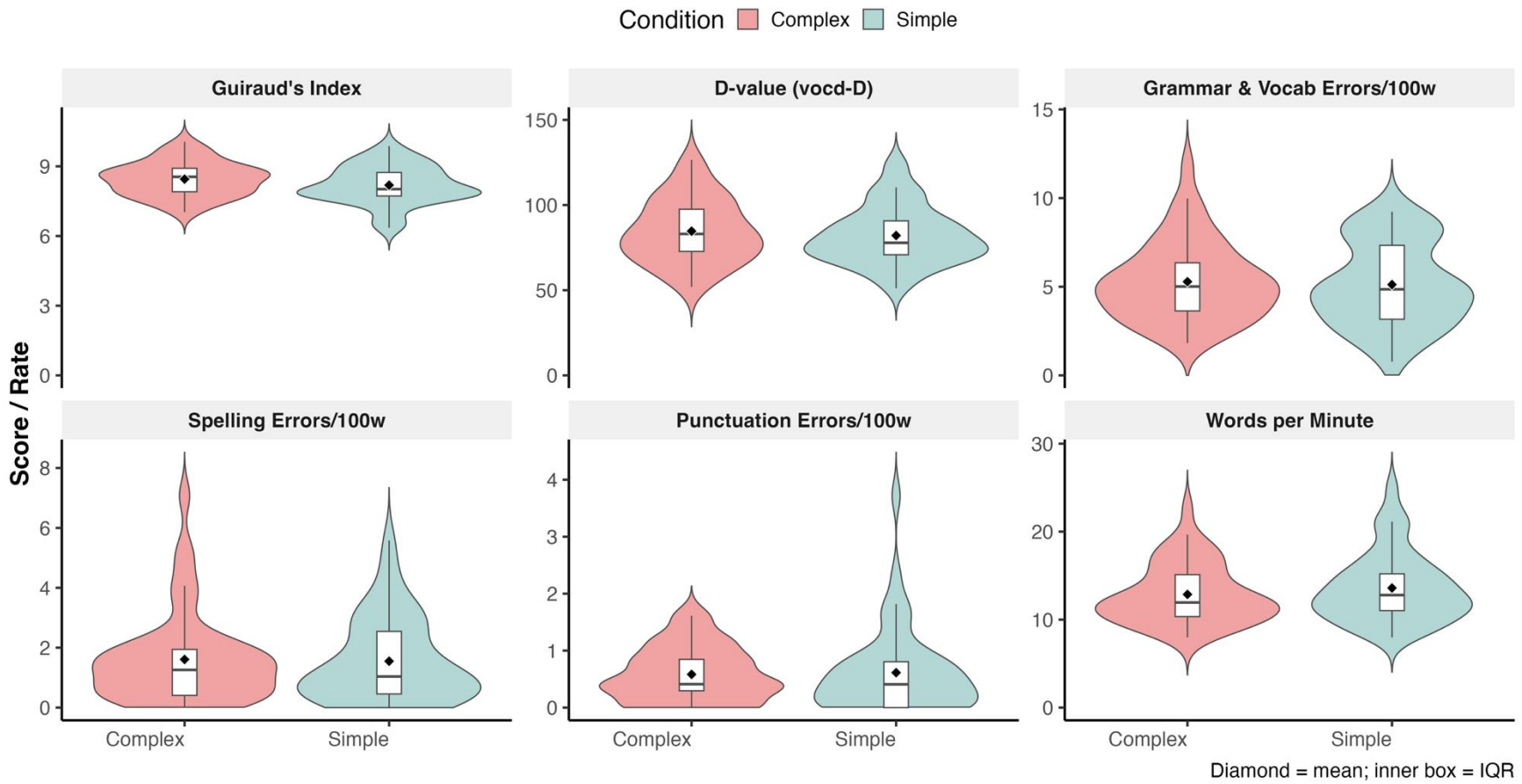
Results: Post-Writing



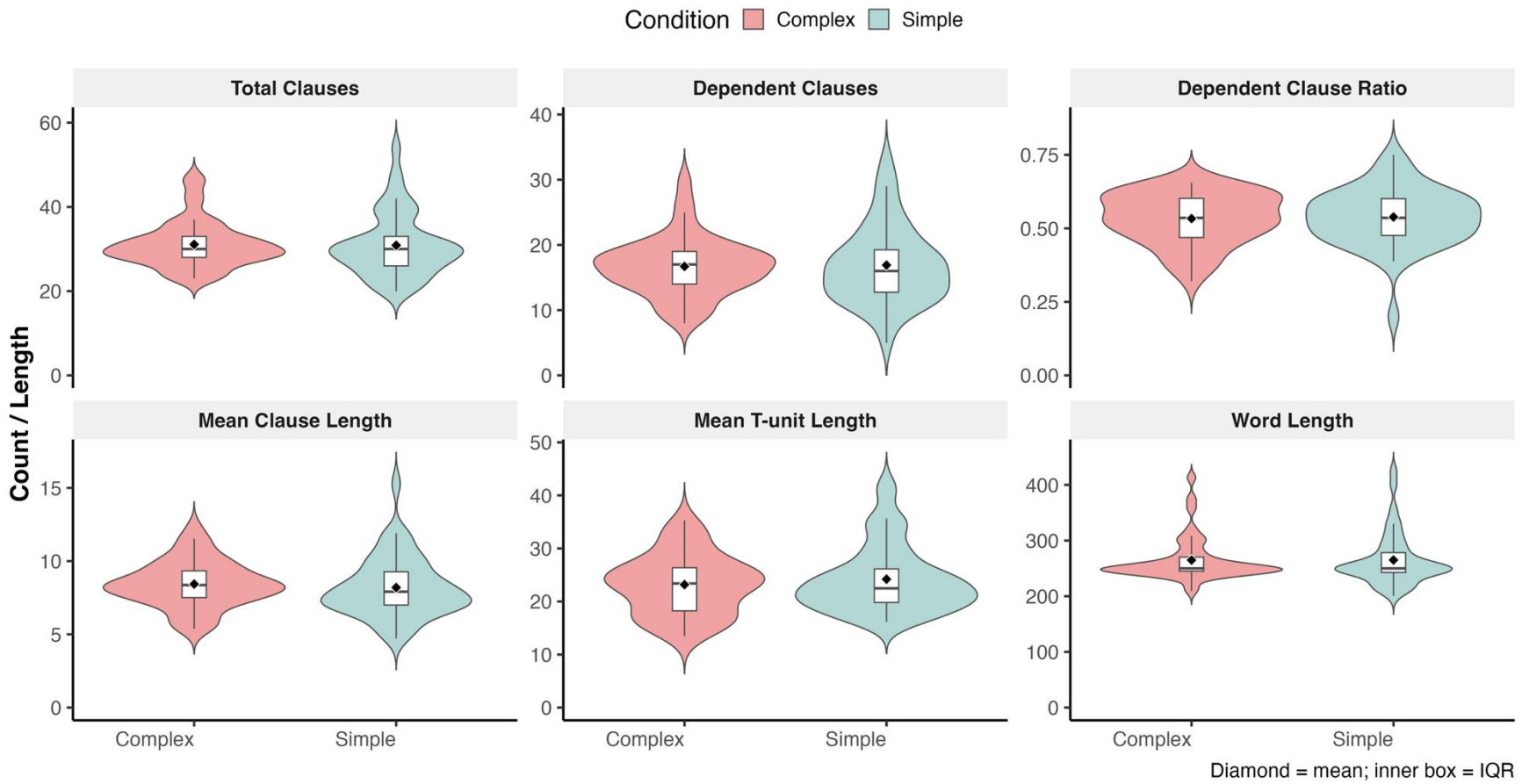
RESULTS:
Text Features

Research Question 2

Results: Lexical Diversity, Accuracy and Fluency



Results: Syntactic Complexity

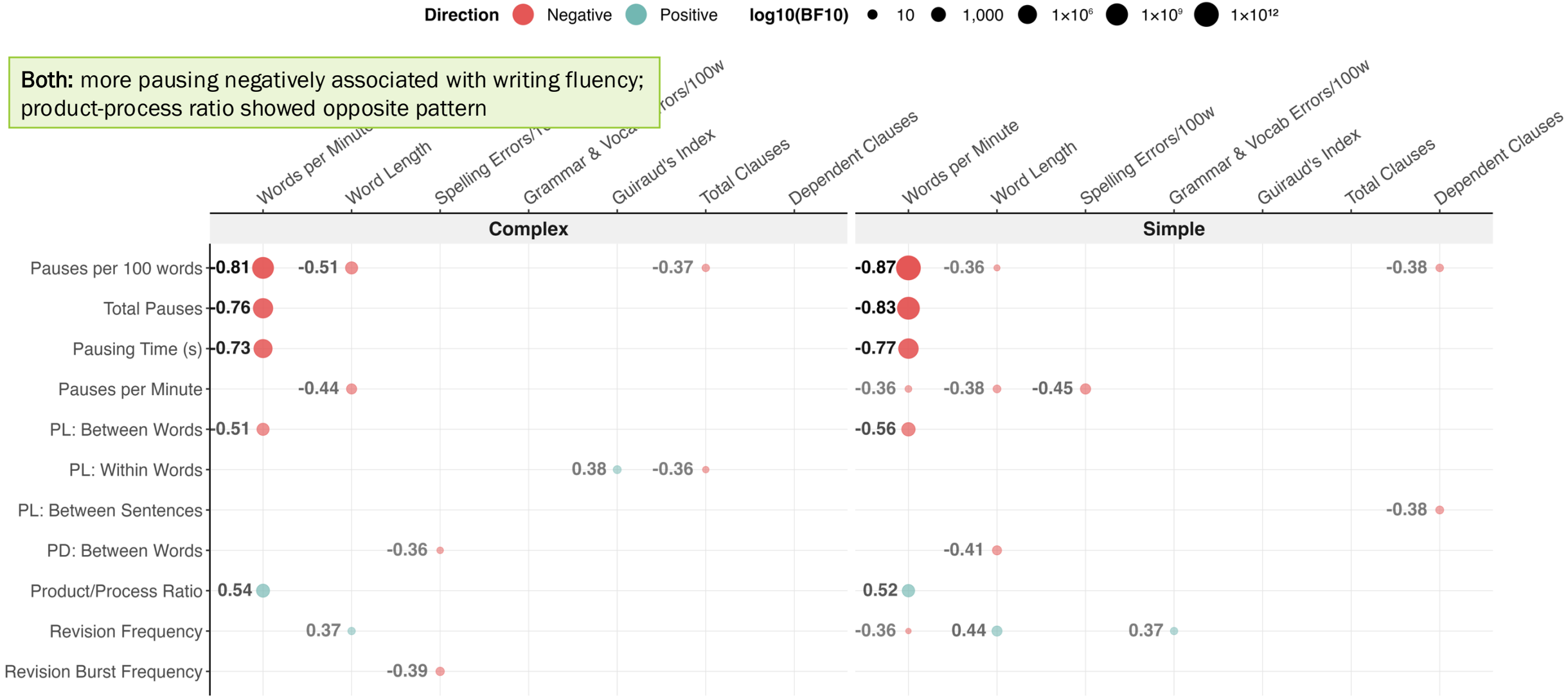


RESULTS: Associations Between Processes and Text Features

Research Question 3

Results: Correlations

Both: more pausing negatively associated with writing fluency; product-process ratio showed opposite pattern



Bubble size = BF10 evidence; r values shown. Only associations with BF10 ≥ 3 included.

Discussion: TC Effects on Writing Processes

- Complexity manipulation changed reported thinking about writing, not typing behavior
  - Without content support, some more effort on planning and structuring
- Why? For advanced writers, argument generation likely already automatic
  - Sweller et al. (2019) Cognitive Load Theory: Intrinsic load must match expertise
    - Content support may have produced a redundancy effect
  - TC effects not universal as task dimensions interact with writer characteristics (academic profile, writing skill, L2 proficiency) (Manchón, 2014; Xu & Zhang, 2025)

Discussion: TC Effects on Text Features and Process-Product Relationships

- No TC effects on the texts produced either
- Highly skilled writers may be too proficient for content support to matter
- Genre and proficiency perhaps more important than idea cues (Manchón et al., 2023; Yoon, 2021)
- Writing is interactive, dynamic, parallel, and recursive (Xu & Zhang, 2025)
  - Writing process ≠ written product
  - Process-level effects don't always surface in final text
- Fluency and efficiency go hand-in-hand
  - Fewer pauses + less deletion = faster writing

KEY TAKE-AWAY

- How writing processes relate to text quality is dynamic
  - It depends on what the task demands from the writer
  - Cognitive load, in interaction with participant characteristics, poses different challenges for writers with varying linguistic knowledge profiles (Kormos, 2023; Xu & Zhang, 2025)

Limitations and Future Directions

- Single task per condition and one proficiency level limits generalizability
- TC manipulation was only partially successful
  - Content support may have been redundant for advanced writers
- Shows a need to:
  - Reconceptualize TC as an interaction between task demands and learner characteristics rather than a fixed property of the task itself
  - Include wider range of proficiency levels and genres
  - Combine keystroke logging with other methods (e.g., eye-tracking, think-aloud)

Conclusions

- TC effects operated to some extent at the macro level but not the micro level
- Findings are consistent with Xu and Zhang (2025) in that TC effects interacted with writer characteristics rather than operating uniformly
- For assessment: Content support likely won't disadvantage advanced writers on argumentative tasks, but can serve as a useful scaffold for lower-proficiency learners who struggle to generate ideas under timed conditions

Thank You / ¡Gracias!

REFERENCES

Abdi Tabari, M., & Lee, J. (2024). The effects of task complexity on linguistic complexity and perception in English native speakers' and L2 speakers' argumentative writing. *Language Awareness, 34(1),* 119-144. https://doi.org/10.1080/09658416.2024.2375226

Jung, Y. (2020). Effects of content support on integrated reading-writing task performance and incidental vocabulary learning. *System*, *93*, 102288. https://doi.org/10.1016/j.system.2020.102288

Jung, Y., & Wang, H. (2025). Writing: Critical issues. In In M. Johnson & M. Abdi Tabari (Eds.), *Cognitive task complexity and second language performance. Understanding learner affect and engagement* (pp. 75-93). Routledge.

Kellogg, R. T. (1996). A model of working memory in writing. In M. C. Levy & S. Ransdell (Eds.), *The science of writing: Theories, methods, individual differences, and applications* (pp. 57-71). Lawrence Erlbaum.

Michel, M., Révesz, A., Lu, X. Kourtali, N. E., Lee, M., & Borges, L. (2020). Investigating L2 writing processes across independent and integrated tasks: A mixed-methods study. *Second Language Research, 36(3*), 277-304. https://doi.org/10.1177/0267658320915

Ong, J. (2014). How do planning time and task conditions affect metacognitive processes of L2 writers? *Journal of Second Language Writing, 23*, 17-30. https://doi.org/10.1016/j.jslw.2013.10.002

Révész, A., Kourtali, N. E., & Mazgutova, D. (2017). Effects of task complexity on L2 writing behaviors and linguistic complexity. *Language Learning*, *67*, 208-241. https://doi.org/10.1111/lang.12205

Robinson, P. (2001). Task complexity, task difficulty, and task production: Exploring interactions in a componential framework. *Applied Linguistics, 22*, 27-57. https://doi.org/10.1093/applin/22.1.27

Robinson, P. (2011). Second language task complexity, the Cognition Hypothesis, language learning, and performance. In P. Robinson (Ed.), *Second language task complexity: Researching the cognition hypothesis of language learning and performance* (pp. 3-38). John Benjamins.

Rong, X. & Révesz, A. (2025). The effects of task complexity on second language writing processes and products in computer-assisted collaborative writing. *System, 69,* 101-216. https://doi.org/10.1016/j.jslw.2025.101216

Skehan, P. (1998). *A cognitive approach to language learning*. Oxford University Press.

Sasayama, S., Malicka, A. & Norris, J. (2025). *Second language cognitive task complexity: A research synthesis*. John Benjamins.

Xu, T.S, & Zhang, L. J. (2025). Modeling second language writing integrating cognitive task complexity. In M. Johnson & M. Abdi Tabari (Eds.), *Cognitive task complexity and second language performance. Understanding learner affect and engagement* (pp. 55-74). Routledge.

Xu, T. S., Zhang, L. J., & Gaffney, J. S. (2021). Examining the relative effects of task complexity and cognitive demands on students' writing in a second language. *Studies in Second Language Acquisition, 44*(2), 483–506. https://doi.org/10.1017/S0272263121000310