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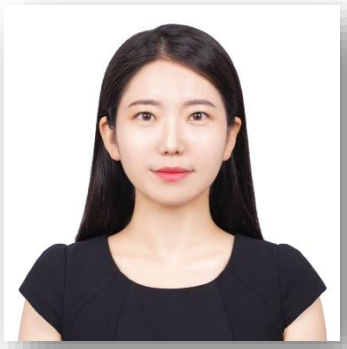

Title of Project
Handwritten Versus Typed Notes: The Impact of Note-Taking Modes in Second Language Listening Tests

Research Supervisor
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TIRF Research Topic Investigated
Language Assessment

Bio
Jieun Kim holds a PhD from the University of Hawai'i at Mānoa, focusing on language testing. She taught English in Korea and received her MA from Seoul National University. Her dissertation examines the effects of different note-taking modes (handwriting versus typing) on L2 learners' listening comprehension and contents of notes (e.g., word count, translanguaging).

Final Report

Motivation for the Research
Assessing academic listening is crucial in language tests for university admissions, as it reflects real-world academic demands. Students often take notes during lectures, a practice shown to aid learning in both first and second language (L1 and L2) contexts. However, the effectiveness of note-taking varies based on its purpose, the content of the notes (e.g., word count, organization, use of symbols, verbatim vs. paraphrased text), and whether students switch languages in their notes.

With more students using computers in classrooms, typing is becoming more common. Typing generally results in longer, more verbatim notes but may lack nonlinguistic elements and deeper processing compared to handwriting. These shifts have implications for language assessments, many of which are now computerized. Note-taking policies in these tests vary widely and are often shaped by logistical concerns rather than research evidence.

Currently, there is limited research on how different note-taking methods affect listening test performance. Only one L2 study (Cubilo, 2017) has explored this topic, and it lacked a no note-taking condition and detailed content analysis of the notes. Addressing this gap, the present dissertation investigates how different note-taking modes—handwriting, typing, and no note-taking—affect L2 learners' performance on lecture comprehension tasks in standardized English proficiency tests. It also analyzes note quality across modes, aiming to inform more equitable and evidence-based testing policies.

Research Questions

1. To what extent do learners' listening test performances differ based on note-taking modes (i.e., handwriting, typing, and no note-taking)?
2. To what extent do test takers' note quality differ between handwritten notes and typed notes?
3. Which note quality measures accurately predict listening comprehension?

Research Methodology

Participants

The participants in the present study comprised 305 EFL Korean university students, including 205 females and 99 males, with one participant choosing not to disclose their gender. Their age ranged from 18 to 52 years, with a mean age of 23.84 years (*SD* = 4.87, median = 23). The oldest participant, who was a 52-year-old graduate student, was planning to study in the U.S. in the near future. Among the final participants, 221 were undergraduates, 18 were graduate students, three planned to enter university in the following academic year, and 29 had graduated from college and were either seeking employment or planning to apply for graduate programs. The remaining 34 were professionals who had graduated from 4-year universities.

Among the final 305 participants, 101 participants were assigned to the control condition, 102 to the handwriting condition, and 102 to the typing condition. Based on self-assessed English proficiency, the three note-taking groups exhibited a similar distribution.

Instruments

Four sets of lectures from the TOEFL iBT, each accompanied by six multiple-choice items, were utilized in this study. To reduce the possibility that Korean participants were familiar with freely accessible practice items and commercial materials, the study used items that were not publicly available. These items were obtained from the TOEFL developer, Educational Testing Service (ETS), through a data request. The mean length of a listening passage was approximately five minutes, with an average of 774 words and a speech rate of 149 words per minute. The comprehension questions were presented after each listening passage. Each set included six multiple-choice items targeting the main idea, supporting details, or inferences. Most items had a single correct answer, but four required selecting two or three correct options. The reliability was Cronbach's alpha = .83 and McDonald's omega = .84. Although the present study included only a single item type, this reliability is consistent with the overall listening section reliability of .83 reported by ETS (2020).

Procedure

The experiment was conducted in person in a quiet room, with a maximum of six participants at a time. Participants were randomly assigned to one of three groups: no note-taking, handwriting, or typing. Participants tested at the same time were assigned to the same note-taking condition. They began by providing consent and accessing the experiment link provided by the researcher. Upon accessing the link, participants completed four TOEFL lecture comprehension tasks, which involved listening to an audio recording while viewing a related image. The audio played automatically once, followed by six multiple-choice questions related to the content. Participants were not allowed to preview the test items, consistent with TOEFL guidelines and Cubilo's (2017) procedures.

Analysis

To address Research Question 1, the overall effects of note-taking mode were analyzed using regression analysis. The independent variable was note-taking group (with three levels), and the dependent variable was the total score out of 24 (4 lectures × 6 items). The alpha level was set at .05. In addition, item-level effects were examined using Rasch modeling with a Differential Item Functioning (DIF) approach. DIF analyses were conducted using Winsteps version 5.5.1, which supports both uniform and non-uniform DIF detection.

To address Research Question 2, note quality was assessed based on several dimensions: word count, information level, verbatim writing, translanguaging, and nonlinguistic elements. Word count was simply tallied for each note. Information units were identified and compared to those in the listening passages in terms of number and level (e.g., major vs. minor ideas). Verbatim writing was assessed by calculating n-gram overlap and stem overlap between the notes and the passages, following prior studies (Luo et al., 2018; Morehead et al., 2019; Mueller & Oppenheimer, 2014). For translanguaging, the percentage of non-English words in the notes was calculated. Nonlinguistic elements such as arrows and drawings were counted manually, particularly for handwritten notes. As normality assumptions were not met for all the note quality measures, the nonparametric Mann-Whitney U test was used. All statistical analyses were conducted in R version 4.3.1 (R Core Team, 2023).

Summary of Findings

Test scores were numerically the highest in the handwriting condition, followed by typing and no note-taking. However, this difference was not significant based on the linear regression. Uniform DIF analyses revealed that one item requiring inference favored handwriting, while another item focusing on main ideas favored typing. No DIF was observed when comparing no note-taking with handwriting or typing. Non-uniform DIF emerged only among lower-ability test takers, with the same items flagged in uniform DIF analyses showing discrepancies between handwriting and typing.

Analysis of note content showed no significant differences between handwritten and typed notes in terms of the number of words (W = 4,802, p = .474, r = -0.06 [95% CI -0.21, 0.10]) and translanguaging (the proportion of non-English words) (W = 4,649.5, p = .278, r = .09, [95% CI -0.24, 0.07]). However, handwritten notes included more information units from the passage (W = 5,923.5, p = .048, r = .16 [95% CI 0.00, 0.31]), verbatim text from the passage (W = 6,202, p = .024, r = .22, [95% CI 0.06, 0.36]), and nonlinguistic elements (W = 8,804.5, p < .001, r = .73, [95% CI 0.64, 0.79])than typed notes.

Based on regression analyses, for the handwriting group, information units were the only significant predictor of test scores while for the typing group, information units positively predicted scores. Verbatim writing and translanguaging had negative impacts.

In summary, the primary finding of this study is the absence of a significant difference in listening test performance across different note-taking modes—control, handwriting, and typing. However, this result should be interpreted in light of the participant population, study materials, test tasks, and the test-taking context. Although no significant differences were found in total listening test scores across note-taking modes, some differences did emerge at the item level.

Furthermore, notes taken in the handwriting and typing conditions differed in terms of information units, verbatim writing, and nonlinguistic elements. These differences raise questions about how they might influence not just test scores, but also deeper aspects of processes underlying listening comprehension that go beyond what is reflected in the overall test scores.

Implications

This study's findings—particularly the non-significant differences in listening comprehension across handwriting, typing, and no note-taking modes—carry important implications for standardized language test developers. While current note-taking policies often prioritize practical and security concerns, they should also be grounded in empirical evidence to support test validity and fairness.

From a validity standpoint, note-taking policies relate to how well a test represents real-world academic tasks (domain definition), whether scores reflect the intended constructs (explanation), and the broader impact of test use (consequences). For example, if listening in English-medium universities involves diverse note-taking behaviors—including typing—then test tasks should reflect this diversity. Moreover, listening processes may subtly vary by note-taking mode, raising questions about whether certain policies (e.g., typing only) introduce unintended construct-irrelevant variance. While excluding note-taking may enhance security and practicality, it may also cause negative washback by discouraging a widely used academic skill.

Fairness concerns also arise. Inconsistent note-taking policies across test formats (e.g., handwriting on paper vs. typing online) may compromise score comparability if the target construct includes note-taking-related processes. Additionally, restricting note-taking to one mode may disadvantage test takers with disabilities or limited access to technology. Typing, in particular, can introduce digital literacy or L2 typing skills as a confounding factor, especially for those unfamiliar with English keyboard input.

This study suggests five possible policy directions: (a) excluding note-taking entirely; (b) allowing only handwriting; (c) allowing only typing; (d) matching note-taking modes to test delivery format (e.g., handwriting in test centers, typing online); and (e) offering both modes regardless of format. Each has trade-offs regarding construct representation, fairness, practicality, washback, and security.

Given the growing diversity of test delivery formats and learners' needs, test developers are encouraged to revisit current note-taking policies using evidence-based approaches. Allowing flexible note-taking modes may better align with modern academic practices, minimize construct-irrelevant variance, and support more inclusive, valid, and fair assessments.

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