Cognitive factors underlying lecture note-taking performance:

Working memory, attention and transcription fluency.

Faculty Development Grant Proposal

Mercy College

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Project Description

The present study aims at exploring how verbal short-term memory (working memory), attention, handwriting speed relate to the ability to take notes in a simulated college-lecture environment.

Note taking is a fundamental skill to succeed in higher-education settings. About 98% of college students engage in some form of note-taking during lectures and, although notes tend to be generally incomplete (reproducing about 40% of lecture content), they account for exam performance better than wider-scope predictors such as verbal ability and GPA (Kiewra et al., 1991).

In cognitive terms, note taking is heavily effortful and it engages the working memory (WM) system at multiple levels: attention, gist extraction, transcription, and simultaneous monitoring of incoming information (Piolat, Olive, & Kellogg, 2005). Presently, very limited data is available that could explain individual differences in note-taking ability and inform evidence-based interventions.

General cognitive models of text writing stress the importance of WM resources (for a review, see Peverly, 2006). However, attempts at investigating the relation between verbal working memory (VWM) and quantity and quality of notes have returned inconsistent results. Some studies reported significant correlations between VWM and notes (Kiewra, 1988; Peverly et al., 2007); however, more methodologically sound ones have failed to replicate these effects (Peverly et al., 2007). Working memory can be conceptualized –and measured- differently according to the theoretical model of reference; therefore, a more thorough examination of which aspects of WM (including the control of attention) are related to note taking is needed at this point.

A clearer picture emerges from studies on the influence of handwriting speed (also defined as transcription fluency) on text writing, in that these have consistently showed that subjects with faster transcription fluency tend to produce written texts of higher quality (Peverly, 2006). One study to date has extended this finding to include a significant relationship between handwriting speed and note taking during lectures (Peverly et al., 2007). So far, however, transcription fluency has been evaluated with short duration handwriting speed tests (Berninger et al., 1997, Wallen, Bonney, & Lennox, 1996) which might elicit ceiling performance in average healthy college students. Moreover, these tasks are heavily verbal, therefore a more exhaustive assessment of handwriting speed is necessary.

Participants

Fifty participants will be recruited from the student population of Mercy College. To be eligible, participants will need to have no history of learning problems, psychiatric or neurological conditions, or hearing impairment. No risk is expected for the participants. Privacy will be protected and IRB administrative review will be requested (Category 1). Participants will receive monetary compensation of $20 for a session of approximately 2 hours.
Materials & Measures

- Operation Span Task (AOSPAN; Unsworth, Heitz, Schrock, & Engle, 2005) and the Attention Network Test (ANT; Fan, McCandliss, Sommer, Raz, & Posner, 2002) will be used to assess the verbal short-term memory and attentional abilities.

- The Alphabet Task (adapted from Berninger et al., 1997), the Handwriting Speed Test (HST; Wallen et al., 1996) and a Non-linguistic symbol copying task will be used to assess handwriting speed.

- Excerpts from college-level lectures in the Test of English as a Foreign Language (TOEFL; Educational Testing Service, 2009) will be used to simulate a classroom experience of note-taking.

Procedure

The experimental session will last approximately 2 hours. Consent form and general instructions will be given first. Two video lectures will be used with their counterbalanced between subjects. Participants will have to take notes in view of a later memory test. Notes will be handwritten on blank ruled paper, which will be collected for later scoring (according to the guidelines provided by Peverly et al. (2007). The cognitive and transcription fluency evaluation will follow. Then, participants will review their notes, they will be allowed a 10-minute resting break, and, finally, their memory for the content of the lectures will be tested with short-answer and multiple-choice questions.

Expected Outcomes

Correlation and regression analyses will be employed to explore which facets of working memory and which transcription fluency measures significantly predict note-taking quality and quantity.

Data scoring will be ongoing. After sufficient data are gathered, data analysis conducted in view of timely presentation in poster format at a professional meeting (e.g.: Society for Applied Research in Memory and Cognition, educational research meetings, student research conferences).

The final results from the entire dataset will be included in a manuscript for publication.

Relevance to you/teaching/mercy?

This research topic will integrate my background in cognitive psychology with my recent interest in students’ learning and cognition, and it will get started an ongoing research program to supplement my teaching duties. This project aims at expanding the focus of my previous research interests in basic cognitive science to include applications to educational settings in everyday contexts.

Moreover, the study will offer interested Mercy College undergraduates the opportunity to engage in research, as research assistants. Assistants will be exposed to planning and design, data
collection, data analysis with SPSS use, poster preparation and the write-up process, with -possibly- the opportunity to present the final work at research meetings on- or off-campus.

Relevance to the field?

The study will shed light on important –but yet unexplored- topics in the field of applied cognitive psychology and educational psychology. It will also provide pilot data for the validation of materials and instruments to be used in follow-up research project on cognitive training for note-taking improvement, for which additional institutional and outside funding sources will be sought.

Budget

Research participants: $25.00 for the entire session x 50: $1250

Research assistant (RAs): Duties will include scheduling and recruitment, test administration and scoring, data analysis. Paid RAs will receive $10.00 per hour. Approximately, research assistance will be required for 100 hours: $1000

Additional research assistant positions can be created for those students who need research experience in exchange for credit (Independent studies) or for those who receive funding from other sources (Undergraduate research apprenticeships, RIMI Grant).

Stipend/Expense reimbursement: $500

Total amount requested: $2750

Timetable

1. The summer semester of 2010 (May-August) will be used for IRB approval, collection of materials, computer programming (cognitive testing will be delivered via SuperLab™ software) and running of pilot subjects. Research assistants will be trained and involved in the preparatory phase of programming and protocol design, which is of highly academic value.

2. In the fall semester of 2010, participants’ recruitment and data collection will start. Scoring of subjects’ performance will be ongoing. Data collection will continue until a sufficient number of research participants have been reached for preliminary analysis.
References


