Chapter 8

Effects of Note-Taking and Working-Memory Span on Cognitive Effort and Recall Performance

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This experiment was designed to assess the cognitive effort (measured using fast reaction times) made by student participants with different working-memory spans when they took notes as they listened to or read a lecture. The students had to use their conventional note-taking technique or an outline-based technique (pre-printed note sheets showing the title and subtitles). Note quantity and formatting (lists of ideas) were measured, as well as the revisions made on the notes taken. The results pointed to the importance of working memory in note-taking. Note-taking while listening demanded more attentional resources than note-taking while reading. Compared to conventional note-taking, the pre-outlined technique triggered a change in note format, but without an increase in cognitive effort. The note takers with a greater working-memory span adapted more easily to the situation that required the most attentional resources, i.e., note-taking on pre-outlined sheets while listening to the lecture.

8.1. Introduction

This study had three aims. The first was to look at how much cognitive effort is allocated during note-taking under different conditions: listening to a lecture or reading the same lecture in written format, while taking notes in the conventional way or using a pre-outlined technique. The second aim was to determine whether a note taker’s particular characteristics (such as memory span) affect the level of involvement in the task. The third was to validate the hypothesis that note formatting — which reflects the way information is processed by the note taker — varies with the note taker’s working-memory span, the
information-intake mode (reading or listening), and the note-taking technique (conven-
tional or pre-outlined).

8.1.1. Note-Taking: A Learning Effect

Note-taking is traditionally considered to serve as an external storage mechanism (Kiewra &
Frank, 1988; Lindberg-Risch & Kiewra, 1990). Note takers listening to a lecture or reading a
text take notes in order to compile a written record of information they will utilize later. But
analyses of the conditions and functional features of note-taking have shown that other cog-
nitive operations are carried out by note takers in addition to the simple transcription of infor-
mation (for a review, see Piolat, 2006; Piolat, Roussey, & Barbier, 2003). For example,
studies on the knowledge acquired by students who did or did not take notes during class
have shown that the information-encoding process that occurs during note-taking triggers
extensive memory storage (Kiewra, 1987). In other words, the sheer fact of taking notes is
thought to provoke the “internal” memorization of the information written down (Castello &
Monereu, 1999; Foos, Mora, & Tkacz, 1994; Laidlaw, Skok, & McLaughlin, 1993;
Norton & Hartley, 1986; Roussey & Piolat, 2003; Williams & Eggert, 2002). This may
seem paradoxical, since the very reason for taking notes is “to be sure not to forget” any
information.

There are two explanations of why memorizing might occur during note-taking. One
possibility is that it results from the selecting and organizing processes note takers carry
out as they attempt to confine their notes to the most useful information (Faber, Morris, &
Lieberman, 2000; Lonska, Lindblom-Yläne, & Maury, 1994; Morgan, Lilley, &
Boreham, 1988; Nist & Hogrebe, 1987; Oakhill & Davies, 1991; Slotte & Lonska, 1999;
Spires, 1993). Another possibility is that memorization is triggered by the decisions note
takers make in order to put information into notes, which are never an exact copy or ver-
batim transcription of what was read or heard (Einstein, Morris, & Smith, 1985; Hadwin,
Kirby, & Woodhouse, 1999; Kiewra, Benton, & Levis, 1987; Kiewra, DuBois,
Christensen, Kim, & Lindberg, 1989). Note takers not only devise ways of abbreviating
words (Branca-Rosoff, 1998; Faraco, Barbier, Falaise, & Branca-Rosoff, 2003), but also
utilize various other note-formatting devices as they attempt to create a written rendition
of a succession of ideas, for example, or of a hierarchical relation between a main idea and
the sub-ideas used to develop it (e.g., indentation with bullets; see Piolat, 2006).

Idea-selection strategies (rough or even fine-grained sorting of critical ideas, etc.) and
note-formatting strategies (lists of sentence fragments, diagrams, etc.; Gruneberg &
Mathieson, 1997) are deliberately employed by note takers as they use a given note-taking
method (e.g., linear approach, outlining, key-word tree structures; Piolat, 2001; Slotte &
Lonska, 1999, 2001). Many studies have focused on the question of the effectiveness of dif-
ferent learning methods (Boyle & Weishaar, 2001; Dye, 2000; Foos et al., 1994; Kiewra,
1991; Kiewra & Benton, 1988; Kiewra, DuBois, Christian, McShane, Meyerhoffer, &
Roskelley, 1991; Kiewra, Benton, Kim, Risch, & Christensen, 1995; Robinson & Kiewra,
1995; Robinson, Katayama, DuBois, & DeVaney, 1998; Roussey & Piolat, 2003; Ruhl &
Suritsky, 1995). Kiewra et al. (1991), for example, assessed the performance of students
employing different note-taking methods during a lecture (conventional format, outline, or
matrix framework). Compared to linear note-taking, which is the most common method