

Effects of Everyday Stress on Prose Recall

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Abstract:

The goal of this study was to explore prose recall with respect to serial position effects in order to determine which parts of the prose passage are forgotten when individuals report high stress. Participants first filled out an Elderly Life Stress Index (ELSI). A short prose passage was then read to the participants who were asked to recall the story immediately, and again about 30 minutes later. The results suggested effects of ELSI on the serial curve at immediate recall. Further analyses indicates an Age by ELSI interaction suggesting high stress may enhance younger adults prose recall, while high stress in older adults impairs prose recall.

Introduction:

This research is an extension of previous investigation by VonDras et al. (2005) reporting effects of everyday stress on prose recall. Johnson et al. (2003) found that mild dementia affects prose recall, but there was no analysis with respect to serial position effects.

Extensive research has suggested that induced stress impairs memory, (Abercrombie et al., 2003; Quervain et al., 2003; Newcomer et al., 1999; Teasdale & Russell, 1983) but not much literature exists that looks

at the effects of everyday stress on recall. Klein & Boals (2001) reports that everyday stress reduces attentional resources of working memory, but their focus was not on prose recall.

There has also been substantial research that looks at memory effects due to the emotional content of words (Kensinger & Corkin, 2003; Mathews & MacLeod, 1994; Teasdale & Russell, 1983). The consensus among many researchers is that negative words are recalled more easily than neutral words. However, most of these studies have only included younger adults. Gröhn et al. (2005) included older adults in addition to younger adults, but their primary focus was whether older adults, in comparison with younger adults, have an increased ability to recall positive words.

This study looks at prose recall throughout adulthood, with special focus on serial position effects, as well as the age related impact of emotionally negative information on prose recall.

Methods and Materials:

The sample included 56 men and women, ranging in age from 19-86, (Mean = 50.08; SD = 19.99), who were recruited from the community to participate in this study.

The subjects' level of stress was assessed using the Elderly Life Stress Index (ELSI), a checklist of stressful events encountered in the past year. Subjects were administered a memory test battery that included the Logical Memory Scale from the Wechsler Memory Scale (3rd edition). The Logical Memory Scale involved

reading a short story to the subject, who was then immediately asked to recall as much of the story as he/she could, (Time 1). Thirty minutes later, the subject was asked again to recall the story, (Time 2).

The subjects were then evaluated using three different scoring techniques: thematic unit, story unit, and verbatim. To score the thematic unit, the story was divided into sections by grouping related information together. This score measures the subjects' recall of the overall gist of the story. For the story unit score, the story was broken down into single words or short phrases called story units; this technique also uses a gist-type of scoring in that to receive a point for a story unit, the subjects did not have to recall the exact word (s), only synonyms were necessary. To score a point for verbatim, however, the subjects needed to recall the exact wording for each unit in the story. The verbatim scoring is an additional method previously used in the Wechsler Logical Memory Scale-Revised.

Results:

Age is often a moderator of Logical Memory performance, thus to explore the effects of ELSI these first analyses control for subject's age.

To investigate Logical Memory-Immediate Recall verbatim, thematic unit, and story unit scores across serial positions, scores were partitioned into beginning, middle, and end of the story. Again, age is controlled by its entry first as a predictor variable. Results of repeated measures analyses on Time 1 verbatim scores indicated

a significant multivariate effect of ELSI on recall of story segments, multivariate $F(2, 51) = 4.14, p < .03, partial\ eta^2 = .14$. Follow-up univariate investigations at the serial position level indicated significant univariate effects for the middle portion of the story, $F(1, 52) = 5.94, p < .02, partial\ eta^2 = .10$. The multivariate effects of ELSI at Time2 did not surpass criterion, $F(2, 48) = 2.08, p = .12, partial\ eta^2 = .12$. Graphic representations of these effects are shown in Panels 1A and 1B of the Figure 1.

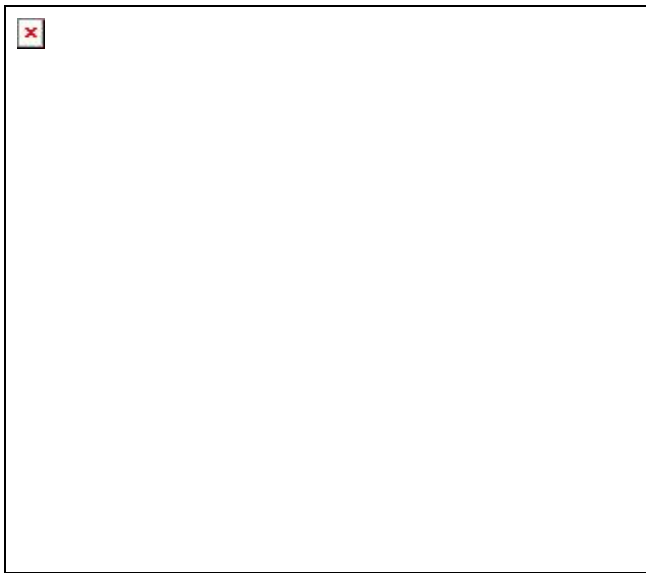
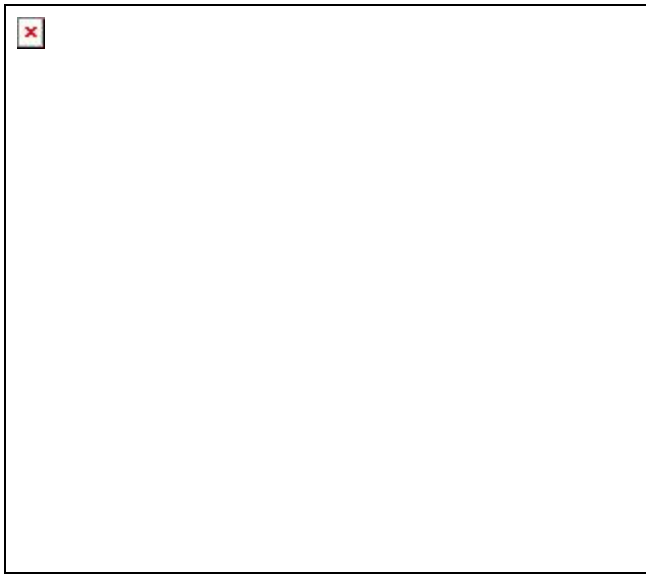
Similar repeated measure analyses were conducted on the Logical Memory-Immediate Recall thematic and story unit scores across story segments. Again controlling for age, results suggested a significant multivariate effect of ELSI on thematic unit scores at Time 1, multivariate $F(2, 51) = 5.41, p < .007, partial\ eta^2 = .18$. Follow-up investigation indicated a significant univariate effect of ELSI in the middle portion of the story, $F(1, 52) = 13.60, p < .001, partial\ eta^2 = .20$. At Time 2 the multivariate ELSI effect again did not surpass criterion, $F(2, 48) = 0.30, p > .05$. Graphic representations of these effects are shown in Panel 2A and 2B of Figure 1.

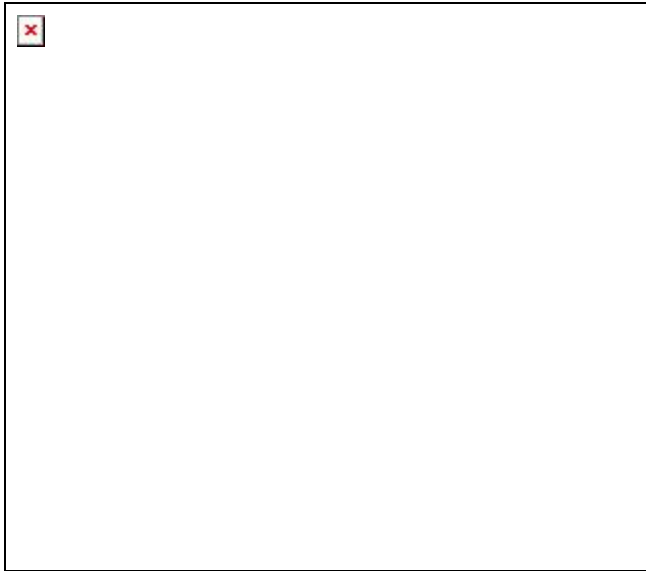
Results of the repeated measure analysis involving story unit scores approached criterion, multivariate $F(2, 51) = 2.87, p < .07, partial\ eta^2 = .10$. Examination at the univariate level indicated a significant effect of ELSI in the middle portion of the story, $F(1, 53) = 5.24, p < .05, partial\ eta^2 = .09$. At Time 2 there was no

multivariate effect for ELSI, $F(2, 48) = 1.74, p < .05$. Graphic representations of these effects are shown in Panel 3A and 3B of Figure 1.

Further analyses explored interactive effects of age and ELSI on the total scores for verbatim recall, story unity, and thematic unit at immediate and delayed recall. Results of a multivariate analysis of verbatim total scores indicated a significant Age by ELSI Interaction, multivariate $F(2, 48) = 3.26, p < .05, partial \eta^2 = .12$. Follow-up univariate analyses indicated this effect to be due primarily to the Age by ELSI interaction at immediate recall, $F(1, 49) = 6.65, p < .02, partial \eta^2 = .12$. However, the effect at delayed recall approached significance criterion, $F(1, 49) = 3.67, p < .07, partial \eta^2 = .07$. Analyses of story unit and thematic scores did not surpass criterion multivariate $F_s < 2.73, p > .08$. Graphic representation of the Age by ELSI Interaction effects on verbatim total scores at immediate recall is shown in Figure 2.

Figure 1: Graphic Representation of Verbatim, Story Unit, and Thematic Unity Scores across Story Segments. Note that a median split was used to create High (ELSI > 3) and Low ELSI (ELSI < 4) groups.





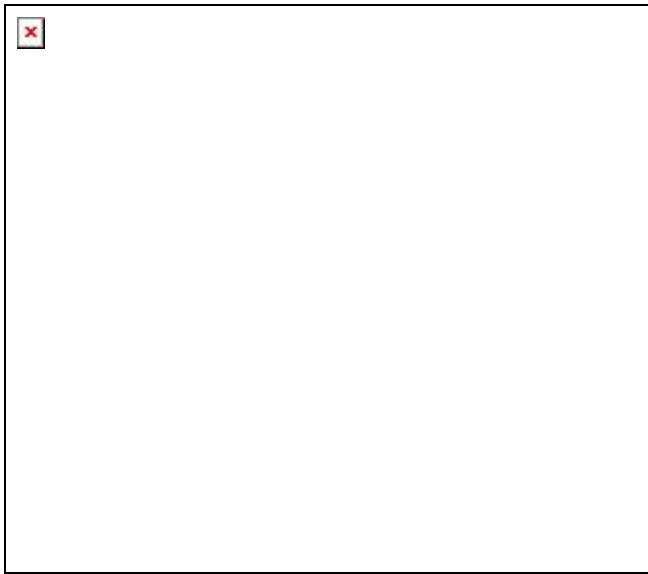
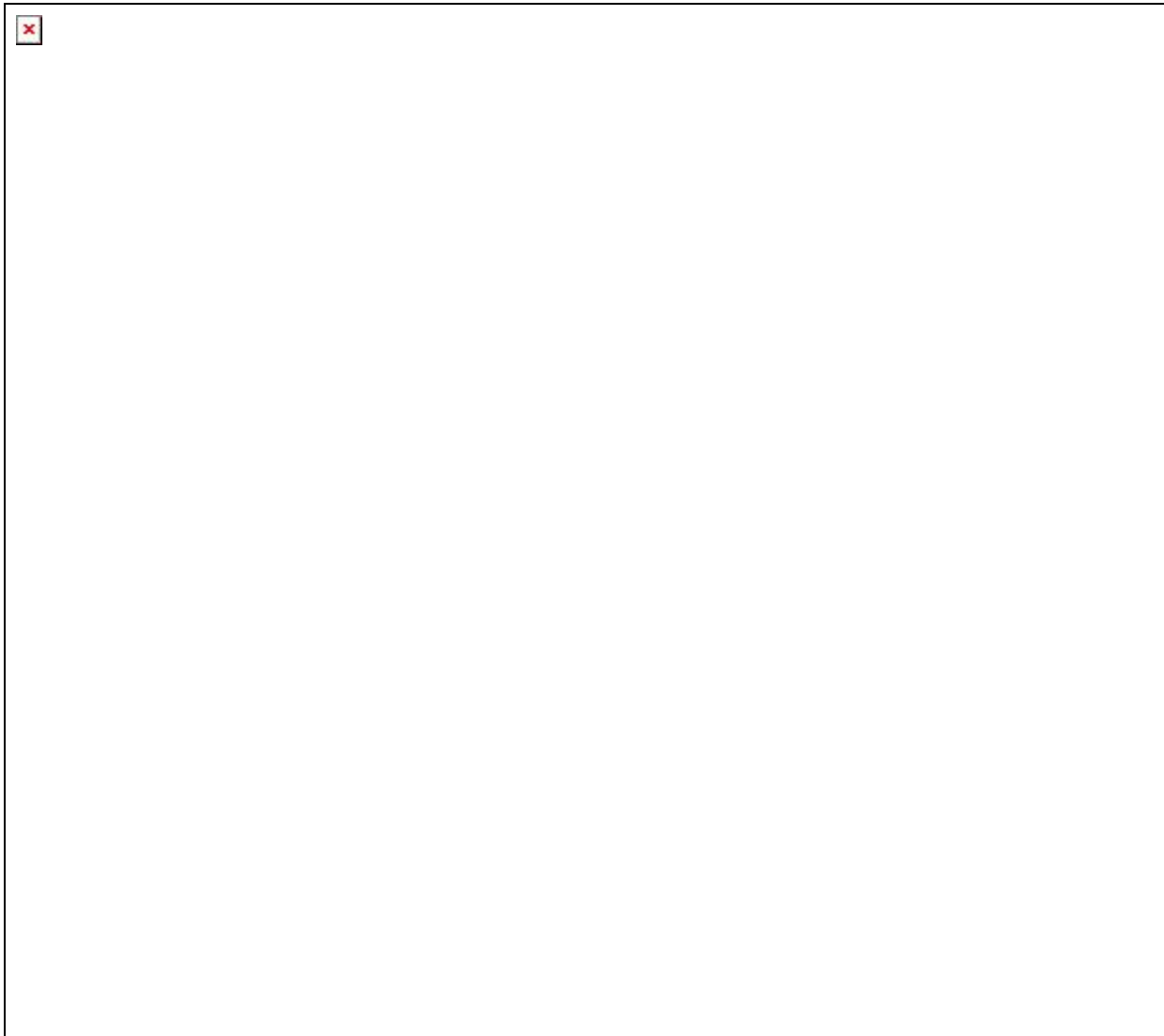


Figure 1: Graphic Representation of the Age by ELSI Interaction for Verbatim Total Score at Immediate Recall. Note that low ELSI = 1 and High ELSI = 5.



Discussion:

There are several possible interpretations of these results. One interpretation suggests everyday stress moderates encoding and retrieving mechanisms (Sliwinski et al., 2006; Klein & Boals, 2001). In other words, the suppression of unwanted, stressful thoughts competes with other resources in working memory, a short-term store of limited space. This effect is evident in the immediate recall for the verbatim and thematic

scores; those with high ELSI scores saw a decline in their recall for the middle segment of the story.

When age is no longer controlled for and the scores for thematic unit, story unit, and verbatim are summed, (see Figure 2), another interesting effect can be observed; younger adults perform better under high stress, while older adults perform better under low stress. This finding is in accordance with Kensinger & Corkin (2003) who show that younger adults are more likely to remember negative information than neutral information. Overall, this research suggests both age and everyday stress moderate the processing and recall of prose information.

References:

Abercrombie, H., Kalin, N., Thurow, M., Rosenkranz, M., & Davidson, R. (2003).

Cortisol variation in humans affects memory for emotionally laden and neutral information.

Behavioral Neuroscience, 117(3), 505-516.

Grühn, D., Smith, J., & Baltes, P. (2005). No aging bias favoring memory for

positive material: evidence from a heterogeneity-homogeneity list paradigm using emotionally toned words. *Psychology and Aging*, 20(4), 579-588.

Kensinger, E. & Corkin, S. (2003). Memory enhancement for emotional words:

Are emotional words more vividly remembered than neutral words? *Memory & Cognition*, 31(8), 1169-1180.

- Klein, K., & Boals, A. (2001). The relationship of life event stress and working memory capacity. *Applied Cognitive Psychology, 15*, 565-579.
- Johnson, D., Storandt, M., & Balota, D. (2003). Discourse analysis of logical memory recall in normal aging and in dementia of the Alzheimer type. *Neuropsychology, 17*(1), 82-92.
- Mathews, A. & MacLeod, C. (1994). Cognitive approaches to emotion and emotional disorders. *Annu. Rev. Psychol, 45*, 25-50.
- Newcomer, J., Selke, G., Melson, A., Hershey, T., Craft, S., Richards, K., et al. (1999). Decreased memory performance in healthy humans induced by stress-level cortisol treatment. *Arch Gen Psychiatry, 56*, 527-533.
- Quervain, D., Henke, K., Aerni, A., Treyer, V., McGaugh, J., Berthold, T., Nitsch, R., et al. (2003). Glucocorticoid-induced impairment of declarative memory retrieval is associated with reduced blood flow in the medial temporal lobe. *European Journal of Neuroscience, 17*, 1296-1302.
- Sliwinski, M., Smyth, J., Hofer, S., & Stawski, R. (2006). Intraindividual coupling of daily stress and cognition. *American Psychological Association, 2*(3), 545-557.
- Teasdale, J. & Russell, M. (1983). Differential effects of induced mood on the recall of positive, negative, and neutral words. *British Journal of Clinical Psychology, 22*, 163-171.

VonDras, D., Powless, M., Olsen, K., Wheeler, D., & Snudden, A. (2004).

Differential effects of everyday stress on the episodic memory test performances of young, mid-life, and older adults. *Aging & Mental Health*, 9(5), 60-70.

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