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Attention and Off-Topic Speech in the Recounts of Middle-Age and Elderly Adults: A Pilot Investigation

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Abstract

Purpose—The discourse of healthy older adults is commonly described as being lengthy and off-topic and is thought to be associated with a general cognitive decline that accompanies healthy aging. The purpose of this preliminary study was to investigate the overall decline in attention associated with healthy aging and its relationship to instances of off-topic speech (OTS).

Method—Thirty cognitively healthy adults divided into 5 age cohorts (40–80) completed cognitive measures of attention and several discourse tasks that included recounting personal events.

Results—Cohorts differed significantly with respect to the measures of attention. However, no significant differences in the incidence of OTS were detected between the cohorts. Attention and the incidence of OTS were not significantly correlated within any of the cohorts.

Conclusion—No significant differences in the incidence of OTS and its relation to attention measures were found. However, the relationship between age-related declines in attention and increased OTS approached significance, suggesting the need for further study.

Keywords

aging; off-topic speech; off-topic verbosity; attention; discourse; language production

The discourse of healthy older adults is commonly described as being lengthy and off-topic. Off-topic speech (OTS), or off-topic verbosity (Arbuckle & Gold, 1993), is operationally defined as speech that begins relevant to a topic but subsequently becomes more loosely related or entirely unrelated to that topic. The influence of age on the incidence of OTS has been studied across the life span, and results have consistently shown that the incidence of OTS increases significantly with age (Arbuckle & Gold, 1993; Arbuckle, Nohara-LeClair, & Pushkar, 2000; Beaudreau, Storandt, & Strube, 2006; Cooper, 1990; Glosser & Deser, 1992; Gold, Andres, Arbuckle, & Zieren, 1993; James, Burke, Austin, & Hulme, 1998; Juncos-Rabadan, Pereiro, & Rodriguez, 2005; Pushkar et al., 2000; Trunk & Abrams, 2009).

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Changes in both inhibition and speed of processing during healthy aging are believed to influence the incidence of OTS observed in language samples of healthy older adults (Arbuckle & Gold, 1993; Arbuckle et al., 2000). The inhibition-deficit hypothesis (Hasher & Zacks, 1988) posits that as we age, it becomes increasingly difficult to ignore irrelevant stimuli, and so the incidence of OTS increases. The ability to inhibit irrelevant information during a language production task is thought to be mediated by selective attention (Drag & Bieliauskas, 2010) as well as shifting attention (Wager, Jonides, & Reading, 2004). *Selective* attention is defined as the "differential processing of simultaneous sources of information" (Johnston & Dark, 1986, p. 44). *Shifting* attention is defined as a paradigm requiring participants to "resolve interference" from competing stimuli, such as irrelevant thoughts that may manifest as OTS (Wager et al., 2004, p. 1,687).

The relationship between age and OTS has been investigated in the context of a number of narrative tasks, including structured interviews (Arbuckle & Gold, 1993; Glosser & Deser, 1992; Gold et al., 1993; Pushkar et al., 2000), conversations (Pushkar et al., 2000), picture descriptions (James et al., 1998; Juncos-Rabadan et al., 2005), personal narratives (Beaudreau et al., 2006; James et al., 1998; Trunk & Abrams, 2009), and procedural narratives (Trunk & Abrams, 2009). The type of task used for discourse elicitation has been shown to impact the incidence of OTS. Specifically, constrained tasks such as picture descriptions are associated with less OTS as compared to unconstrained tasks such as personal narratives (see Mortensen, Meyer, & Humphreys, 2006, for review).

Researchers have hypothesized that constrained tasks provide a scaffold for language production that is not available in unconstrained tasks, enabling unconstrained tasks to place greater cognitive demands on the speaker and increase the likelihood of interference and an inability to inhibit unwanted thoughts and ideas (James et al., 1998). Of particular interest to the current pilot study are those studies that have investigated the influence of age or attention on the incidence of OTS within an autobiographical (unconstrained) context (Arbuckle & Gold, 1993; James et al. 1998; Trunk & Abrams, 2009). One particular personal narrative task of importance to this pilot study was a recount. *Recounts* are personal, episodic narratives that require the participant to recall and retell a past experience (Trautman, Healey, & Norris, 2001). Consequently, we selected the following studies to review because they are most similar to the population and stimuli used in the current pilot study.

Arbuckle and Gold (1993) investigated the role of inhibition on the incidence of OTS in healthy older adults using a life-history interview task. The study included 196 adults ages 61 to 90. The Trail-Making Test from the Halstead-Reitan Battery (Reitan & Davison, 1974) was used to measure shifting attention, and the Wisconsin Card-Sorting Test (WCST; Milner, 1964) was used to measure inhibition; both tests were combined to form an inhibition factor score. OTS was measured using a 9-point continuum. The scale estimated both item verbosity (i.e., number of answers to questions where the participant spoke off-topic) and extant verbosity (i.e., degree to which the answer was off-topic).

Correlation matrices and regression analyses revealed a statistically significant main effect for the impact of age on attention and OTS (Arbuckle & Gold, 1993). The older group (ages 73–90) performed more poorly on both attention measures and had significantly poorer scores on the OTS measures compared to the younger group (ages 61–72). Interestingly, age was a better predictor of item verbosity than extant verbosity. In addition, the most significant predictor of both item and extant verbosity in the life-history interviews was the participants' scores on the measures of inhibition. Results support the inhibition-deficit hypothesis (Arbuckle & Gold, 1993). The authors concluded that the age-related increase in

OTS was the result of widespread cognitive decline rather than declines in language processing areas of the brain (Hasher & Zacks, 1988).

James et al. (1998) investigated OTS and task type in two groups of healthy adults. They asked 20 young adults (M = 19.4 years, SD = 1.2) and 20 older adults (M = 73.1 years, SD = 4.2) to recount three personal narratives and describe three pictures. The number of words scored as off-topic served as the measure of OTS. Each instance of OTS was deemed either *indirectly relevant* or *irrelevant*. Results indicated that the incidence of OTS was significantly greater for the older group compared to the younger group for the personal narratives but not for the picture descriptions. James et al. hypothesized that personal narratives allowed for more autobiographical information to invade the participants' thought processes. James et al. further hypothesized that once that information was accessed, it was not inhibited and so manifested as OTS. The authors concluded that age-related differences in producing OTS are conditional and depend on the nature of the task as well as the degree to which the task constrains language production.

Trunk and Abrams (2009) examined OTS in healthy, younger and older adults in the context of two autobiographical narratives: an episodic narrative (i.e., describe one specific memory) and a procedural narrative (i.e., describe an individual's daily routine). Twenty-four younger adults (ages 18–21) and 24 older adults (ages 75–87) participated in the study. OTS was measured as a percentage of total words spoken off-topic. Older adults exhibited significantly more OTS when computed as a percentage of total words spoken compared to the younger group, but for procedural narratives only. Although no measure of attention was included in this study, the authors concluded that their results did not support the inhibition-deficit hypothesis due to a lack of statistically significant differences in the incidence of OTS between constrained and unconstrained tasks. However, these conclusions should be interpreted cautiously due to the fact that the "constrained" task in this study was not truly constrained because it was a procedural *narrative* (i.e., a retelling of a person's individual routine, such as "Describe how you get ready every morning") rather than a procedural *description* (e.g., "Tell me how to make a peanut butter and jelly sandwich").

Taken together, these studies support the idea that the incidence of OTS increases with age. However, findings regarding the specific influence of attention on the incidence of OTS remain unclear. Although changes in attention are frequently cited as a possible explanation for increased OTS with age, studies have not consistently included a measure of attention and/or inhibition. Therefore, the purpose of this preliminary study was to investigate the influence of attention on the incidence of OTS in healthy adults from middle age to elderly in the context of a series of recount tasks. We asked the following research questions:

- Are laboratory measures of selective and shifting attention significantly related to the incidence of OTS in healthy adults?

  We hypothesized that poorer scores on measures of attention would significantly correlate with higher instances of OTS across age groups. Moreover, we hypothesized that we would observe a linear increase in the incidence of OTS with age and a concomitant linear decrease in attention abilities with age.

- At what point in the life cycle does the relationship between the incidence of OTS and performance on measures of attention become apparent?

  We hypothesized that the relationship between attention and OTS would become significant beginning at age 60 because age 60 has generally been referred to as the beginning of the "elderly" years in previous studies (Arbuckle & Gold, 1993; Arbuckle et al., 2000; Gold et al., 1993; Pushkar et al., 2000).

METHOD

Participants

Data for this pilot investigation were part of a larger study investigating discourse processing in healthy aging across the lifespan. Participants included 30 healthy adults grouped into five age cohorts (40–89), with six participants per cohort (see Table 1). Each cohort included an equal number of males and females, and participants had a mean education level of 16.33 years (*SD* = 2.82). The protocol for the larger study required that all participants meet the following inclusion criteria: (a) hearing within functional limits as measured by the Central Institute for the Deaf List of Everyday Speech (Davis & Silverman, 1970); (b) Native English speakers as documented by self-report; (c) negative history for cognitively deteriorating conditions such as Alzheimer's or Parkinson's per self-report as well as measured by a scaled score of ≥29 on the Mini-Mental Status Examination, Second Edition (Folstein & Folstein, 2002); (d) aided or unaided visual acuity within normal limits, as indicated by passing a vision screening (Beukelman & Mirenda, 1998); (e) no depression at the time of the experiment as measured by a score of 0–4 on the Geriatric Depression Scale—Short Version (Yesavage, 1988); and (f) no previous neurological condition (i.e., stroke, head injury) per self-report.

Experimental Procedure

Participants were tested individually across two sessions (labeled as cognitive and discourse sessions), each lasting between 1–2 hr. During the initial session, participants gave consent for the study and completed screening tasks to determine their eligibility to participate. Demographic data and medical history were obtained during this session. Participants who met the study's inclusion criteria then completed either the cognitive tasks or the discourse tasks. The order of sessions and tasks was randomized and counterbalanced across participants using a randomization table and Latin square design, and all language samples were audio or video recorded. No difference in the quality of the transcriptions was noted between the audio and video recordings.

Cognitive Measures

All cognitive measures were administered by trained graduate research assistants (RAs), and all assessments were timed using a stopwatch. The following measures of attention were administered to participants during the cognitive session: the Comprehensive Trail-Making Test (CTMT; Reynolds, 2002) and the STROOP Color and Word Test (STROOP; Golden & Freshwater, 2002). For purposes of this investigation, only scores from selected subtests of the CTMT and STROOP are reported and were subjected to statistical analyses. For the CTMT, only the difference of the time (seconds) taken to complete Trail 5 versus Trail 1 was analyzed. Trail 5 is considered the most difficult trail and requires the participant to connect alternating letters and numbers in serial order in the presence of empty distracter circles. Trail 1 is considered the least difficult trail and requires the participant to draw a line between circled numbers 1 through 25 consecutively without distracters. The CTMT has not been previously used in the literature as a predictor of OTS but is a suitable choice because preliminary research suggests that both selective and shifting attention may be involved in the mechanism of inhibition during speech production (Mar, 2004; Wager et al., 2004). For the STROOP task, only scores from the third and most difficult task, the Color-Word portion, were subjected to statistical analyses. In this task, the participant labels colors that are printed in noncorresponding ink (e.g., the word RED printed in blue ink) while ignoring the printed word. This task is scored according to the number of colors that are labeled correctly in 45 s. This task was selected based on preliminary research by Hasher, Lustig, and Zacks (2007), who proposed that researchers could cautiously draw conclusions about

verbal rehearsal and task management during speech production by administering a visuospatial selective attention task such as the STROOP Color-Word Test.

Discourse Tasks and Language Analysis

Participants completed 11 tasks for the discourse session. For purposes of this investigation, only the results of the three recount tasks are reported here. For the recount tasks, the examiner read the following script once:

> I am going to tell you about a recent experience. Let me tell you about my spring break. My family and I took a trip to Daytona Beach, Florida. There were five of us. We drove and it took us 20 hours to get there. We spent the days lying on the beach getting a sunburn, and at night, we went out for dinner and then played Putt-Putt. We had a great time!

Demonstration of the task was followed by a prompt for each recount: “Now it is your turn. Tell me what you did last weekend. Tell me about your last vacation. Tell me about your last holiday (celebration).” For each recount, if the participant stopped before 15 s, the examiner prompted with, “Is there anything else you can tell me?” Trained graduate RAs obtained the language samples and were required to follow the same script to account for standardized administration across participants.

Before analyzing the language samples for OTS, we segmented the transcripts into C-units or independent clauses. C-units were determined according to rules described by Loban (1976). We also calculated the total number of words (TNW) for each recount using rules outlined by Nicholas and Brookshire (1993). Unintelligible words, made-up words, partial words, nonword fillers (e.g., *um, er, uh*), and commentary that started or ended the sample (e.g., *here I go, that’s all)* were eliminated from the analysis. All remaining words were subjected to the following rules: Whole words and acronyms were counted as one word, contractions such as *don’t* and *can’t* were counted as two words, and shortened versions of two words such as *gonna* and *wanna* were counted as the two words representing *going to* and *want to*. Following C-unit segmentation and word counts, the percentage of OTS was obtained for all participants.

Rating OTS

OTS has typically been scored holistically, yielding one single rating per transcript (Trunk & Abrams, 2009), or at the word level (Arbuckle & Gold, 1993; Beaudreau et al. 2006; James et al., 1998). When reported, reliability for rating OTS in these studies ranged from 78% to 98%, which prompted us to develop an OTS rating scale that included a smaller range of scores (Arbuckle & Gold, 1993; Beaudreau et al., 2006; Glosser & Deser, 1992). The present OTS scoring system combines aspects from previously reviewed studies (Arbuckle & Gold, 1993; James et al., 1998) and was closely modeled after Glosser and Deser’s (1992) global coherence rating scale. The Glosser and Deser scale rated each C-unit from 1 (*least coherent*) to 5 (*most coherent*). For this pilot study, we defined OTS as the relationship of the content of each utterance to the overall conversational topic—a definition comparable to that of Glosser and Deser’s definition of global coherence. Therefore, OTS was any utterance that veered from the initial topic. However, the range of the Glosser and Deser scale allowed for a significant amount of subjectivity, thus prompting us to create a smaller OTS rating scale for our study that restricted the scoring range to 1 through 3. Appendix A contains a copy of the scale we developed for this study.

Procedures and rules for scoring OTS were initially developed by the first author (CLW). To refine the rules, three graduate students in communication sciences and disorders reviewed the rules, which included examples from transcripts, then each independently rated three

transcripts for practice. Following that initial rating, the students collaborated with the first author, and any disagreements were resolved through discussion. Rules for scoring OTS were then adjusted for clarity. This process was repeated twice more so that each rater scored nine transcripts. Once interrater reliability was consistently >90%, the rules and procedures were considered complete.

Each C-unit received a score of 1, 2, or 3. A score of 1 was defined as an utterance (C-unit) that was *unrelated* to the stimulus/topic, where the utterance required a significant amount of inference to try to figure out how it could be related to the overall stimulus/topic. A score of 2 was defined as an utterance (C-unit) that was *indirectly relevant* to the stimulus/topic, where the information provided in the utterance was not essential but was still loosely related to the main topic. Additionally, the utterance required a small amount of inference to figure out the intended relevance of the content. A score of 3 was defined as an utterance (C-unit) that was obviously and *directly related* to the stimulus/topic and provided main details about the topic; the utterance required no inference. An OTS percentage was obtained for each participant by adding the total number of 1s and 2s (total utterances that were considered off-topic) and dividing that total by the number of utterances per transcript. This resulted in the percentage of the language sample that consisted of OTS for each participant. An example transcript rated for OTS is provided in Appendix B. All scoring and training documents are available from the authors upon request.

Language Transcription and Reliability

All recounts were orthographically transcribed from the audio or video recordings. Using Computerized Language Analysis software (CLAN; MacWhinney, 2000), 10% of the samples were randomly selected for a second transcription to determine intrarater and interrater reliability for word-by-word transcription agreement. Agreements and disagreements were subjected to the following formula:

$$\frac{\text{total agreements}}{\text{total agreements}+\text{total disagreements}} \times 100$$

Intrarater agreement was 99.15%, and interrater agreement was 99.69%. For scoring OTS, 10% of the transcribed recounts were randomly selected and were rescored by trained RAs. Agreements and disagreements were calculated using the above method; point-to-point intra- and inter-rater agreement for coding OTS was 90.33% and 93.70%, respectively.

Analyses

Given the small sample size, we analyzed the relationships among age, attention, and OTS using descriptive statistics, simple correlations, and one-way analyses of variance (ANOVAs) using PASW Statistics (SPSS Inc., 2001). The measures of shifting and selective attention (difference in CTMT Trails 1 and 5; STROOP Color-Word score) were combined to create one standardized attention score. The combined score was derived to examine the relationship between attention and OTS using one inhibition factor score as calculated in previous research (Arbuckle & Gold, 1993; Arbuckle et al., 2000). Trails 1 and 5 of the CTMT were transformed to natural logarithms due to skewness, and all measures of attention were standardized into z scores. CTMT z scores were reversed to account for negative coding as compared to the STROOP's positive coding. Combined z scores were then standardized to form a standardized attention score on a scale of −2 to +2, where −2 was the worst possible attention score and +2 was the best.

Preliminary Analyses

We conducted preliminary analyses to ensure that demographic characteristics were not contributing factors to the study results (Table 1). Simple one-way ANOVAs indicated no significant differences between cohorts with respect to years of education ($p = .354$), so years of education was not considered in subsequent analyses. Additionally, to determine whether the OTS scores for individual recount topics (e.g., vacation, weekend, and holiday) could be combined, a one-way ANOVA was performed; the between-subject factor was cohort, and the within-subject factor was recount topic. Results indicated no significant difference in mean OTS for the three tasks ($p > .05$). Therefore, the OTS scores were collapsed into one score that reflects the mean percentage OTS for the three recounts. Significance level was set at .05.

RESULTS

To address the main purpose of the study, we computed Pearson product–moment correlation coefficients for the variables of interest, by cohort. Correlations of attention scores and OTS were not statistically significant, regardless of cohort ($p > .05$), and no trend was identified. Table 2 provides all Pearson r correlation coefficients and corresponding p values.

To further explore the relationships between age and attention and age and OTS, we performed a series of post hoc one-way ANOVAs with the scores grouped by cohort. The first one-way ANOVA had a between-group factor of cohort and a within-group factor of standardized attention score. Results indicated a significant difference in the standardized attention score between cohorts, $F(4, 25) = 4.99$, $p = .004$. Post hoc comparisons revealed that the attention scores for the 40-year-olds differed significantly from those for the 70-year-olds, $p = .042$, and 80-year-olds, $p = .001$. Attention scores for the 50-year-olds also differed significantly from those for the 70-year-olds, $p = .026$, and 80-year-olds, $p = .001$. Reported means and standard deviations for the measures of interest by cohort are summarized in Table 3.

Because no linear decline was evident for the standardized attention score by cohort, we compared means for each individual measure of attention (i.e., CTMT and STROOP) across cohorts. One-way ANOVAs revealed a significant difference between cohorts for mean STROOP scores, $F(4, 25) = 5.25$, $p = .003$, and mean CTMT scores, $F(4, 25) = 3.70$, $p = .017$. Post hoc comparisons revealed significant differences in mean STROOP scores between the 40-year-olds and 70-year-olds, $p = .023$; 40-year-olds and 80-year-olds, $p = .004$; 50-year-olds and 60-year-olds, $p = .017$; 50-year-olds and 70-year-olds, $p = .006$; and 50-year-olds and 80-year-olds, $p = .001$. Post hoc comparisons also revealed significant differences in the mean CTMT Trail 5 scores between the younger and elderly groups: 40-year-olds and 80-year-olds, $p = .005$; 50-year-olds and 80-year-olds, $p = .002$; and 60-year-olds and 80-year-olds, $p = .005$. These results are summarized in Table 4.

We conducted additional one-way ANOVAs to investigate the relationships between age and OTS and age and TNW. Results indicated that the difference in mean OTS across cohorts approached significance, $F(4, 25)$, $p = .061$, as did the difference in mean TNW across cohorts, $F(4, 25)$, $p = .067$.

DISCUSSION

The purposes of the current study were to (a) investigate the impact of laboratory measures of shifting and selective attention on the incidence of OTS in healthy adults and (b) determine at what point in the life cycle increased incidence of OTS and decreased

performance on measures of attention become apparent. We hypothesized that advancing age would be associated with poorer scores on measures of attention and a simultaneous increase in OTS. Furthermore, based on previously reported findings, we hypothesized that increased OTS and declines in attention would become apparent at around age 60. What follows is a discussion of the study results, limitations, future directions, and clinical importance.

Attention, OTS, and Age

Research has consistently demonstrated an increase in OTS with age, and this has been shown to be related to a concomitant decline in attention with age (Arbuckle & Gold, 1993; Arbuckle et al., 2000). However, the outcomes of this preliminary study do not support these findings. There are two possible reasons for these differences: (a) differences in the ages of the participants across studies, and (b) differences in the stimuli used per study. For example, previous studies investigated the relationship between age, attention, and OTS among elderly participants only, which may have strengthened the relationship between attention and OTS given that age-related declines in attention have been shown to markedly decrease in the elderly years (Arbuckle AQ & Gold, 1993; Arbuckle et al., 2000). Furthermore, these studies used a life-history interview as their unconstrained task to elicit OTS. Life-history interviews are considered a series of recounts in question–answer form and are much longer than recounts. Consequently, the nature of the task may have resulted in a greater incidence of OTS simply because talk time was increased, thus providing more opportunities for OTS.

Other possible explanations for the lack of statistically significant findings in our study could be the decision to collapse measures of shifting and selective attention scores into one attention score, as had been done in previous research. It could be that combining scores masked any possible relationships between the different measures of attention, age, and OTS. With respect to mean STROOP scores, pilot data suggested a linear trend such that the 60-, 70-, and 80-year-olds performed significantly poorer as compared to the 40- and 50-year-olds. The results for the CTMT were more difficult to interpret, and no clear trend was evident. Furthermore, differences in TNW and OTS across cohorts approached significance. Taken together, these additional analyses suggest the need for further investigation of the relationships between age, attention, and OTS. Increasing the number of participants per cohort, and examining the relative influence of each measure of attention on OTS, could clarify the relationships between age, attention, and OTS.

For this pilot study, attention and OTS were investigated in the context of one type of language production task, which also may have contributed to the lack of significant relationships between age, attention, and OTS. It has been shown that the incidence of OTS is sensitive to task type, specifically, the degree of constraint that is placed on language production (James et al., 1998). James et al. (1998) showed that recounts are more likely to elicit OTS because they are unconstrained and are more open to interpretation on the speaker's part. Therefore, investigating the relationships between age, attention, and OTS in a single task only may have limited the findings.

Investigating the relative influence of attention and age on OTS in the context of a constrained and unconstrained task has a number of benefits. First, examining the variables of interest in two different types of tasks would allow investigators to better isolate the influence of specific variables, especially age. This way, investigators could further validate how age influences OTS across a variety of tasks for each individual *and* how different measures of attention influence OTS across tasks for each individual. Such an approach would serve to dampen the influence of individual variability in language performance and provide investigators with more information about how OTS behaves across ages in a

variety of tasks. Additionally, using both an unconstrained and a constrained task would test the consistency of response across individuals with regard to OTS, which would provide a clearer picture of natural narrative production across ages.

With regard to our second research question, findings showed weak support concerning the age at which increased OTS and declines in attention become apparent. However, post hoc findings for performance on the STROOP test suggested a more marked decline in selective attention beginning at around age 60. These findings were limited due to the small *n* per cohort and may become clearer with increased sample size. It remains unclear when in the lifespan increases in OTS emerge. However, because 60 has been considered the beginning of the elderly years in previous research regarding age, attention, and OTS (Arbuckle & Gold, 1993; Arbuckle et al. 2000), further investigation is warranted.

Future Directions

Follow-up studies are necessary to further investigate the relationships between age, attention, and OTS. Studies should include greater numbers of participants across the lifespan rather than focusing on comparisons of young and old or all elderly. It is important to consider the relative influence of different types of attention measures on OTS as they could be variably affected by age. In addition, the incidence of OTS, and the influence of attention and age, should be investigated in the context of both a constrained and an unconstrained task to better understand the individual contributions of age and different types of attention on the incidence of OTS.

Lastly, individual communication style is another important consideration for future studies. Individuals whose style of communication would be described as verbose may be more susceptible to incidences of OTS, and this should be considered in study design.

Clinical Importance

Despite the absence of statistically significant findings, the questions raised by this preliminary study have important clinical implications. Discourse is an area that is often assessed and treated by speech-language pathologists (SLPs), and it is important to consider the influences of both age and cognitive processes on language performance in adults with acquired communication disorders. For assessment purposes, knowledge of the differential impact of age and cognitive processes on OTS during discourse production may assist SLPs when choosing and manipulating tasks to obtain a more natural language sample from clients. Further research on attention and OTS in the context of both constrained and unconstrained tasks in healthy adults from middle age to elderly may provide insight as to what degree age and certain cognitive processes hinder language performance.

The questions raised by this study are particularly applicable to the treatment of adults with acquired neurogenic communication disorders. Given the variable presentation of acquired communication disorders, SLPs need strategies for considering the cognitive requirements of language production tasks in response to individual strengths and abilities. With a better understanding of the relationships between age, attention, and the incidence of OTS, clinicians may be able to manipulate the cognitive requirements of discourse production tasks over the course of treatment or understand that OTS may be a natural process of healthy aging.

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References

Arbuckle TY, Gold DP. Aging, inhibition, and verbosity. Journal of Gerontology. 1993; 48(5):225–232.

Arbuckle TY, Nohara-LeClair M, Pushkar D. Effect of off-target verbosity on communication efficiency in a referential communication task. Psychology and Aging. 2000; 15(1):65–77. [PubMed: 10755290]

Beaudreau SA, Storandt M, Strube MJ. A comparison of narratives told by younger and older adults. Experimental Aging Research. 2006; 32:105–117. [PubMed: 16293571]

Beukelman, D.; Mirenda, P. Augmentative and alternative communication: Management of severe communication disorders in children and adults. 2. Baltimore, MD: Brookes; 1998.

Cooper PV. Discourse production and normal aging: Performance on oral picture description tasks. Journal of Gerontology: Psychological Sciences. 1990; 45(5):210–214.

Davis, H.; Silverman, SR. Hearing and deafness. 3. New York, NY: Holt, Reinhart, and Winston; 1970. rev

Drag LL, Bieliauskas L. Contemporary review 2009: Cognitive aging. Journal of Geriatric Psychiatry and Neurology. 2010; 23(2):75–93. [PubMed: 20101069]

Glosser G, Deser T. A comparison of changes in macro linguistic and micro linguistic aspects of discourse production in normal aging. Journal of Gerontology: Psychological Sciences. 1992; 47(4): 266–272.

Gold DP, Andres D, Arbuckle T, Zieren C. Off-target verbosity and talkativeness in elderly people. Canadian Journal on Aging. 1993; 12(1):66–77.

Golden, CJ.; Freshwater, SM. STROOP Color and Word Test manual. Chicago, IL: Steeling; 2002.

Folstein, M.; Folstein, S. Mini-Mental State Examination—2nd Edition. Lutz, FL: PAR; 2002.

Hasher, L.; Lustig, C.; Zacks, R. Inhibitory mechanisms and the contol of attention. In: Conway, AR.; Jarrold, C.; Kane, MJ.; Miyake, A.; Towse, JN., editors. Variation in working memory. New York, NY: Oxford University Press; 2007. p. 227-249.

Hasher L, Zacks RT. Working memory, comprehension, and aging: A review and a new view. Psychology of Learning and Motivation. 1988; 22:193–225.

James L, Burke D, Austin A, Hulme E. Production and perception of “verbosity” in younger and older adults. Psychology and Aging. 1998; 13(3):355–367. [PubMed: 9793112]

Johnston WA, Dark VJ. Selective attention. Annual Review of Psychology. 1986; 37:43–75.

Juncos-Rabadan O, Pereiro AX, Rodriguez MS. Narrative speech in aging: Quantity, information content, and cohesion. Brain and Language. 2005; 95:423–434. [PubMed: 15913755]

Loban, W. Language development kindergarten through grade twelve (Research Rep. No. 18). Urbana, IL: National Council of Teachers of English; 1976.

MacWhinney, B. The CHILDES project: Tools for analyzing talk. 3. Mahwah, NJ: Erlbaum; 2000.

Mar RA. The neuropsychology of narrative: Story comprehension, story production, and their interrelation. Neuropsychologia. 2004; 42(10):1414–1434. [PubMed: 15193948]

Milner, B. Some effects of frontal lobectomy in man. In: Warren, JM.; Akert, K., editors. The frontal granular cortex and behavior. New York, NY: McGraw-Hill; 1964. p. 313-334.

Mortensen L, Meyer AS, Humphreys GW. Age-related effects on speech production: A review. Language and Cognitive Processes. 2006; 21:238–290.

Nicholas LE, Brookshire RH. A system for quantifying the informativeness and efficiency of the connected speech of adults with aphasia. Journal of Speech and Hearing Research. 1993; 36(2): 338–350. [PubMed: 8487525]

SPSS Inc. PASW Statistics (Version 18) [Computer software]. Chicago, IL: Author; 2001.

Pushkar D, Basevitz P, Arbuckle T, Nahara-LeClair M, Lapidus S, Peled M. Social behavior and off-target verbosity in elderly people. Psychology and Aging. 2000; 2:361–374. [PubMed: 10879589]

Reitan, R.; Davison, L. Clinical neuropsychology: Current state and applications. Wiley, NY: Winston; 1974.

Reynolds, CR. Comprehensive Trail-Making Test manual. Austin, TX: Pro-Ed; 2002.

Trautman LS, Healey E, Norris JA. The effects of contextualization on fluency in three groups of children. Journal of Speech, Language, and Hearing Research. 2001; 44:564–576.

Trunk DL, Abrams L. Do younger and older adults' communicative goals influence off-topic speech in autobiographical narratives? Psychology and Aging. 2009; 24(2):324–337. [PubMed: 19485651]

Wager TD, Jonides J, Reading S. Neuroimaging studies of shifting attention: A meta-analysis. Neuroimage. 2004; 22:1679–1693. [PubMed: 15275924]

Yesavage J. Geriatric Depression Scale—Short Version. Psychopharmacology Bulletin. 1988; 24(4): 709–711. [PubMed: 3249773]

APPENDIX A. OFF-TOPIC SPEECH (OTS) RATING SCALE

3 = The utterance (C-unit) is **obviously and directly related** to the stimulus/ topic and provides main details about the topic. No inference is required by the listener.

2 = The utterance (C-unit) is **indirectly relevant** to the stimulus/topic. The information provided in the utterance is **not essential** but is still loosely related to the main topic. A small amount of inference is required by the listener to figure out what the subject is trying to convey.

1 = The utterance (C-unit) is **unrelated** to the stimulus/topic. A significant amount of inference is required by the listener to try to figure out how the utterance could be related to the overall stimulus/topic.

APPENDIX B. EXAMPLE TRANSCRIPT WITH OTS RATINGS

Prompt following example script: "Tell me about your last vacation."

Utterance	OTS score
Subject: our last vacation was to Gatlinburg because obviously every vacation we take has something to do with shopping.	3–Refers directly to last vacation
Subject: if it's not shopping everywhere we're going it's shopping all the way to the place and all the way back.	2–Difficult to interpret if he is talking about vacation shopping or just shopping
Subject: and it turned out to be a little nippy I'll just say.	3
Subject: and we had the grandson with us.	3
Subject: and all the grandson wanted to do was ride the go-karts.	3
Subject: and so it worked out fine.	3
Subject: I got to watch the grandson ride the go-karts.	3
Subject: and the wife spent the day shopping.	3
Subject: and the following day we did exactly the same thing rode the go-karts different spot but one go-kart's just like another go-kart.	3
Subject: but he thought they were great ya know.	3
Subject: and then the end of that day why then my daughter and her husband came down.	3
Subject: so then the grandson was uh glad because he had somebody to ride go-karts with him because I was not going to ride the go-karts with him.	3
Subject: I would have taken him out playing golf.	3
Subject: but he wanted to ride the go-karts.	3
Subject: once they got there to take care of the grandson why then that freed me up.	3
Subject: I like alone time at home.	1–Not referring to vacation at all; difficult to infer why this utterance fits here
Subject: and I could go to the bar and drink beer while everybody's shopping and doing their things.	3
Subject: and it worked out quite well.	3
Total % OTS (total 1s+2s/total # utterances)	2/18 = 11.11% OTS

Table 1

Reported means and standard deviations of the demographic variables of interest, by cohort (n = 6 per cohort).

	40s		*50s*		*60s*		*70s*		*80s*	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Male:Female	3:3		3:3		3:3		3:3		3:3	
Age	44.83	3.8	54.5	3.0	64.1	3.4	73.8	2.9	82.8	2.4
Education	16.5	3.4	17.8	2.6	16.8	2.4	16	3.3	14.5	1.7
MMSE[a]	48.5	10.6	52.0	3.1	57.3	3.7	62.8	4.1	67.6	11.3
GDS[b]	1.0	.6	.7	1.2	1.3	1.5	.7	1.2	2.3	2.5

[a]MMSE = Mini-Mental State Examinationn (Folstein & Folstein, 2002) scaled score;

[b]GDS = Geriatric Depression Scale—Short Version (Yesavage, 1988).

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Table 2

Reported Pearson product–moment *r* correlation coefficients of attention and off-topic speech (OTS) and corresponding *p* values (*n* = 6 per cohort).

	40s	50s	60s	70s	80s
Pearson *r*	.06	−.21	.45	−.17	−.18
p value	.91	.70	.37	.75	.73

Table 3

Reported means and standard deviations for the outcome measures of interest, by cohort (n = 6 per cohort)

	40s		*50s*		*60s*		*70s*		*80s*	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
CTMT Trail 1[a]	36.5	11.9	36.3	8.0	42.5	16.5	45.8	14.6	72.5	41.1
CTMT Trail 5[b]	59.2	42.5	50.7	11.0	59.6	12.0	92.3	27.5	137.0	80.5
CTMT Diff[c]	22.6	32.3	14.3	6.6	17.1	11.1	46.5	17.4	64.5	47.8
STROOP C-W[d]	44.1	9.8	47.5	7.0	32.0	10.1	29.5	9.7	24.6	14.3
TNW[e]	276.6	128.5	329.8	141.7	437.8	340.4	1028.3	851.3	484.3	451.0
OTS Total[f]	20.6	21.5	10.8	9.6	25.0	18.2	41.3	22.8	36.9	19.0

[a]Comprehensive Trail-Making Test (Reynolds, 2002) Trail 1 time in seconds;

[b]CTMT Trail 5 time in seconds;

[c]CTMT Trail 5 time in seconds – Trail 1 time in seconds;

[d]STROOP Color-Word subtest (Golden & Freshwater, 2002) raw score;

[e]Total number of words for recounts;

[f]Total score for OTS (percentage).

Table 4

Analysis of variance for age, attention, TNW, and OTS.

	Sum of squares	df	*Mean square*	F	*Sig.*
STROOP					
Between groups	2308.200	4	577.050	5.251**	.003
Within groups	2747.167	25	109.887		
Total	5055.367	29			
CTMT Diff					
Between groups	11282.467	4	2820.617	3.701**	.017
Within Groups	19052.500	25	762.100		
Total	30334.967	29			
TNW					
Between groups	2170979.133	4	542744.783	2.511*	.067
Within Groups	5404369.667	25	216174.787		
Total	7575348.800	29			
OTS Total					
Between groups	3668.244	4	917.061	2.592*	.061
Within groups	8843.489	25	353.740		
Total	12511.733	29			
STD Attn[a]					
Between groups	12.867	4	3.217	4.985**	.004
Within groups	16.133	25	.645		
Total	29.000	29			

[a]Combined, standardized attention score.

*p approached significance.

**$p < .05$.