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## Off-Topic Verbosity and Sustained Attention Among Young Adult and Older Adult Age Cohorts

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<http://hdl.handle.net/10950/2668>

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OFF TOPIC VERBOSITY AND SUSTAINED ATTENTION

OFF-TOPIC VERBOSITY AND SUSTAINED ATTENTION AMONG YOUNG ADULT AND  
OLDER ADULT AGE COHORTS

by

JESSICA HELPHREY

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Science in Clinical Psychology  
Department of Counseling & Psychology  
Michael Barnett, Ph.D., Committee Chair  
College of Arts and Sciences

The University of Texas at Tyler  
May 2020

OFF TOPIC VERBOSITY AND SUSTAINED ATTENTION

The University of Texas at Tyler  
Tyler, Texas

This is to certify that the Master's Thesis of

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Abstract

OFF-TOPIC VERBOSITY AND SUSTAINED ATTENTION AMONG YOUNG ADULT AND  
OLDER ADULT AGE COHORTS

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May 2020

Off-topic verbosity (OTV) is tangential discourse with excessive and irrelevant information. Older adults have been historically labeled as having high OTV, and research has suggested that high OTV in older adults may be linked with cognitive decline. While past studies have utilized brief cognitive measures to further expound upon the links between cognition and OTV, studies have lacked consistency and lengthy measures. This study sought to elucidate the relationship between OTV and cognition in both older adult and young adult age cohorts utilizing a sustained attention measure. Young adults ( $n = 61$ ; age range: 18-28,  $M = 20.57$ ,  $SD = 2.33$ ) and older adults ( $n = 81$ ; age range: 60-98,  $M = 76.35$ ,  $SD = 8.21$ ) provided speech samples and participated in the Conner's Continuous Performance Tests – III (CPT-3). Speech samples were rated for tangentiality, egocentrism, and quantity of speech. A MANOVA was conducted and found a multivariate effect for age; older adults scored higher on tangentiality and egocentrism facets of OTV only. A MANCOVA to elucidate how measures in the CPT-3 (commissions and omissions, which represent impulsivity and inattention) affect OTV facets found no significant age differences. Tangentiality displayed moderately significant age differences when controlling for attention. Results suggest that the inattention and impulsivity may mediate age differences in facets of OTV, and specifically inattention may be a mechanism driving age differences in tangentiality.

Chapter 1

Introduction and General Information

**Off Topic Verbosity and Older Adults**

A common negative stereotype of older adults is that, while speaking, they tend to narrate excessively and include off-target, irrelevant information (Ruscher & Hurley, 2000). Off-topic verbosity (OTV) is defined as a tendency to display tangentiality in discourse that includes excessive or unnecessary information; OTV has been characterized by a lack of coherence and a failure to maintain focus on a topic (Arbuckle & Gold, 1993). Evidence suggests that older adults do, in fact, exhibit more OTV than young adults (Arbuckle & Gold, 1993; Glosser & Deser, 1992; James, Burke, Austin, & Holme, 1998; Juncos-Rabadan, Pereiro, & Rodriguez, 2005); however, the precise explanation for these age differences remains unclear. Some research has suggested that OTV may be linked with age-related cognitive decline (Arbuckle & Gold, 1993; Pushkar et al., 2000). However, previous research investigating the relationship between OTV and neurocognitive functioning has utilized relatively brief measures of attention and executive functioning (Arbuckle & Gold, 1993). The purpose of this study was to investigate the relationships between OTV and neurocognitive functioning among young adults and older adults using a lengthier measure of sustained attention.

**Neuropsychological Domains in Relation to OTV and Aging**

Numerous cognitive functions show age-related declines, including inhibition, set shifting (Salthouse, Atkinson, & Berish, 2003), processing speed, and attention (Wills, Capitolo, & Wright, 2011). Research suggests that OTV may increase with age due to age-related changes in these underlying cognitive functions, particularly in executive functions of inhibition (Royall, Mahurin, & Gray, 1992). To date, the extant research has utilized inconsistent methods, including comparing specifically choosing a small sample of older adults with high OTV and assessing those characteristics (Arbuckle, Nohara-LeClair, & Pushkar, 2000). While both decreases in attention and increases in OTV are linked with

aging, some research has not found a direct link between lower attention and higher OTV among age cohorts (Wills, Capilouto, & Wright, 2012). Other studies have found that OTV among the older adults has been directly linked with declines in attention and planning (Wright et al., 2014; Jensen, 2012; Alexander, 2006). The assertion that OTV is linked with age-related decline faced opposition when an early study found that thoughts irrelevant to a topic actually decrease with growing age (Giambra, 1989). Gold and Arbuckle's subsequent longitudinal study to test this hypothesis found that a minority of their sample elicited OTV, but those that did had higher ages and decreased ability to inhibit interference. This longitudinal study also parsed out a causal relationship from age, to inhibition-based impairment in attention, and then to OTV (Gold & Arbuckle, 1995). In general, the research on this topic has yielded inconsistencies in measures of attention, age cohorts, and findings (Jensen, 2012). Prior investigation has screened high vs. low OTV in an inconsistent way (James et al., 1998; Trunk & Abrams, 2009), and further work is needed to differentiate OTV among young and older adult age cohorts.

### **Facets of OTV**

Distinct facets of OTV have been defined and investigated to further understand how right hemispheric damage-related communication deficits mimics many of the same discourse qualities seen in aging. While left hemispheric damage tends to cause aphasia, damage to the right hemisphere of the brain tends to cause discourse incoherence (Johns, Tooley, & Traxler, 2008). Indeed, the right hemisphere also tends to be dominant for arousal and attention maintenance, whereas the left hemisphere is more dominant for carrying out analytic operations (Riccio, Reynolds, Lowe, & Moore, 2002). Therefore, it can be postulated that measures of sustained attention and speech qualities may be asymmetrically elucidated in the brain. Blake (2006) proposed these distinct facets to be tangentiality, egocentrism, and quantity. Tangentiality, as the hallmark of OTV, is the failure to maintain focus (Arbuckle & Gold, 1993), which is separate from egocentrism, or overpersonalized responses (Blake, 2006). The third facet of OTV, quantity, describes lengthier discourse (Blake, 2006). Egocentrism has been identified in older adults as a result of communication goals changing secondary to cognitive decline (Pushkar, Peled, & Nohara-

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LeClaor, 2000). Indeed, egocentrism has also been found to be linked with higher age (Looft & Charles, 1971; McDonald & Stuart-Hamilton, 2003). Finally, Gold (1988) proposed that an increase in egocentrism is linked to increased quantity and tangentiality of speech.

Chapter 2

Literature Review

**Proposed Explanations of Age-Related Changes in OTV**

Two primary hypotheses have been employed to explain why OTV may increase with age: the inhibitory deficit hypothesis and the pragmatic change hypothesis. The inhibitory deficit hypothesis (Hasher & Zacks, 1988) contends that the lack of ability to suppress irrelevant stimuli increases with age due to diminished working memory and the inability to suppress irrelevant information. This hypothesis is based on evidence that the prefrontal cortex's ability to inhibit responses slows with age (West, 1996). The defective inhibitory mechanisms that come with age thus contribute to higher levels of OTV (Arbuckle, Nohara-LeClair, & Pushkar, 2000). The inhibitory deficit hypothesis has garnered support in part because of the links between OTV and age as well as the association with OTV and poorer cognitive inhibitory scores (Arbuckle & Gold, 1993). It has been suggested that, of the inhibitory mechanisms of speech (Zacks & Hasher, 1994) – which include accessing, deleting, and restraining – older adults tend to have a malfunction in the deletion of extraneous content (Ying & Peng, 2016). Therefore, older adults produce more OTV as a result. The restraint function, which is often used synonymously with inhibition (Miyake et al., 2000), is associated with goal maintenance and is argued to be a part of the inhibitory regulation mechanisms as well (Hasher, Lustig, & Zacks, 2008). In addition, older adults tend to have more information available for access than younger adults (O'Kane, 2003); however, this accessibility function is less efficient in older adults (Hasher, Lustig, & Zacks, 2008).

In contrast, the pragmatic change hypothesis contends that older adults exhibit specific intentions of communication as adaptive responses to context (Boden & Bielby, 1983; James, Burke, Austin, & Hulme, 1998). This hypothesis is supported by research suggesting that older adults endorse more interest in personal narrative, reminiscing, acknowledging their identities, and discussing significant life events (Burke, 1997; James, Burke, Austin, & Hulme, 1998) and opposes the hypothesis of cognitive

deficits being due to inhibitory dysfunction as a byproduct of an aging prefrontal cortex (Hasher & Zacks, 1988). Survey research regarding expressive and communicative goals has found that older adults exhibit less focus on procedural topics and report a variety of objective goals, not emphasizing succinctness, a goal reported by many young adults (Trunk & Abrams, 2009). Thus, from the standpoint of the pragmatic change hypothesis, OTV may represent a communication style in which there is less emphasis on brevity and greater emphasis on personal narrative. In this study, we investigated age differences in OTV from the standpoint of the inhibitory deficit hypothesis by examining relationships between speech characteristics and neurocognitive test performance.

### **Measurement Issues Related to OTV and Cognitive Functioning**

The link between OTV and attention among age cohorts has been studied using relatively brief measures. For example, Arbuckle and Gold (1993) utilized the Halstead-Reitan Trail Making Test (Reitan, 1992) as measure of attention and found that declines in inhibiting task irrelevant stimuli was related to increases in age. The Trail Making Test is a measure of divided attention, visual scanning (Lezak, Howieson, & Loring, 2004), and cognitive flexibility in switching between sets of numbers and letters on part B of the test (Strauss, Sherman, & Spreen, 2006). Although these tests have demonstrated construct validity (Sánchez-Cubillo, et al., 2009; Atkinson & Ryan, 2008) and are among the most widely-used tests neuropsychologists use to study attention (Lezak, Howieson, & Loring, 2004), they are quite brief in duration, lasting less than 5 minutes. A broad literature suggests that individuals with attentional disorders or impairments to attention are sometimes able to maintain attention for brief periods of time (Johnson et al., 2001; Tucha et al., 2017). For this reason, measures of sustained attention – which measure the ability to maintain attention and respond during a repetitive task (Van Zomeren & Brouwer, 1994) – are often considered the “gold standard” of attentional testing and among some of the most commonly used measures of attention (Rabin, Paolillo, & Bar, 2016) and has proven moderate clinical utility in detecting adult ADHD (Epstein, Conners, Sitarenios, & Erhardt, 1998). Sustained attention is typically measured with a continuous performance test (Riccio, Reynolds, Cecil, Lowe, &

Moore, 2002). In these tests, a computer flashes a stimulus letter every second for 15 minutes and requires the participant to inhibit clicking or pressing a spacebar (originally a lever) unless he or she sees an 'X'. (Rosvold, Mirsky, Sarason, Bransome, & Beck, 1956). One particular continuous performance task – the CPT-3 – yields scores of commission errors, which represent impulsivity if the participant presses the spacebar on letters other than 'X', especially with overlapping quick hit reaction time, another output measure. The assessment additionally yields scores of omission errors, which occur as a result of inattention when the participant fails to press the spacebar at the appropriate time (Conners, 2000). No extant research has examined the relationship between OTV and sustained attention as measured by a continuous performance test. The purpose of this study was to elucidate the unknown relationship between OTV and cognitive functioning among young adult and older adult age cohorts.

### **Current Study**

OTV has been linked with inattention and inhibition, although inconsistently (Jenson, 2012; Ying & Peng, 2016); thus, there is still a need for further elucidation of the relationship between OTV and neurocognitive functioning. This study was novel in that a continuous performance test was used to measure sustained attention, providing a lengthier and more robust of neurocognitive functioning. The expansion of this research could further expound upon the inhibitory deficit hypothesis to differentiate between inhibition and attention at a goal-oriented, theoretical level, or at the neurocognitive, behavioral level (Burke, 1997). Because age-related OTV has been found to be associated with a post-mechanism of inhibitory behaviors such as inappropriate responses (Yin & Peng, 2006), we hypothesized that impulsivity (i.e., commission errors) and inattention (i.e., omissions errors) would mediate age cohort differences in ( $H_1$ ) tangentiality, ( $H_2$ ) egocentrism, and ( $H_3$ ) quantity of speech.

## Chapter 3

### Materials and Methods

#### **Participants**

Participants ( $N = 142$ ) consisted of two age cohorts: young adults ( $n = 61$ ) and older adults ( $n = 81$ ). The young adult age cohort consisted of undergraduate students enrolled in a psychology course at one of two public universities in the southern U.S. (65.6% female, 34.4% male; age range: 18-28,  $M = 20.57$ ,  $SD = 2.33$ ). These students were recruited through the respective departments' SONA system, where students can volunteer to participate in studies in exchange for course credit. Regarding ethnicity of the young adult age cohort, 34.4% identified as white/Caucasian, 19.7% as black/African American, 19.7% as Latinx, 6.6% as Asian/Pacific Islander, and 19.7% as another ethnic group or multiracial. The older adult age cohort consisted of healthy, community-dwelling older adults who were recruited through announcements in public settings, such as senior conventions, retirement communities and independent living facilities, and civic organizations (65.4% female, 27.2% male, 4.9% unspecified; age range: 60-98,  $M = 76.35$ ,  $SD = 8.21$ ). Regarding ethnicity of the older adult age cohort, 71% identified as white/Caucasian, 2.5% as black/African American, 3.7% as Latinx, 1.2% as Asian/Pacific Islander, and 4.9% as another ethnic group or multiracial.

#### **Procedure**

The original research project was approved by the committee for the protection of human subjects at two universities (University of North Texas and the University of Texas at Tyler). Informed consent was obtained from all participants prior to data collection. Participants completed demographics questionnaires and a battery of neuropsychological tests and provided autobiographical and procedural speech samples, a paradigm similar to that of Trunk & Adams (2009).

## Measures

### Speech Samples

Participants provided two speech samples. For the autobiographical memory speech prompt, participants were asked: “*Describe a time in which you took a trip or vacation.*” For the procedural memory speech prompt, participants were asked: “*Please tell me how to make the following meal: eggs, coffee, and a bowl of fruit.*” Participants were given 5 minutes per prompt to speak. Participants’ speech was audio recorded and transcribed for blind raters to the age of the participants. The independent raters decided on tangentiality, verbosity, and egocentrism levels of each speech sample (Margaret, 2006). Interrater agreement for both prompt types and all three facets of off topic verbosity (tangentiality, quantity, and egocentrism) ranged between 0.52 - 0.92 (average reliability overall was .89).

### Conners’ Continuous Performance Test – III (CPT-3)

Conners’ Continuous Performance Test – II (CPT-3; Epstein, Conners, Sitarenios, & Erhardt, 1998; Conners, 2000) is a computer-administered measure of sustained attention. In this test, participants are oriented to a computer screen without any prior fixation stimuli, shown letters of the alphabet in varying speeds, and are instructed to press the spacebar when they see an ‘X.’ A short practice trial of 60 seconds comes first, followed by the primary test, which lasts 14 minutes and consists of 6 blocks of 60 trials each with varied intervals between trials (1 second, 2 seconds, or 4 seconds). The CPT-3 measures behaviors such as inattentiveness and impulsivity. Inattentiveness is operationalized by a high amount of omission errors the CPT-3 (Epstein, Conners, Sitarenios, & Erhardt, 1998), or failing to press the spacebar appropriately. Inattention is also suggested when quick reaction time is paired with commission errors. Alone, commission errors tend to suggest impulsivity (Conners, 2000), which occur as a result of inappropriately pressing the spacebar.

### Data Analysis Plan

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A Multivariate analysis of variance was conducted in order to elucidate how age affects the three facets of OTV. A full factorial multivariate analyses of covariance (MANCOVA) was conducted in order to determine whether inattention or impulsivity mediate between age cohort and facets of OTV (i.e., tangentiality, quantity, and egocentrism). Age cohort (1 = young adult, 2 = older adult) was the independent variable, and CPT-3 omission and commission errors were the covariates. All three of the OTV variables (tangentiality, egocentrism, and quantity) were dependent variables in the model.

Chapter 4  
Results and Discussions

**Results**

First, we conducted a MANOVA in order to determine whether the age cohorts varied on the variables of interest. Assumption testing was conducted to check for normality, outliers, homogeneity of variance, and no violations were found. Levene's test for equality of variances found that sample variances were not significantly different. In this model, age cohort was the independent variable, and the three OTV variables (i.e., tangentiality, egocentrism, and quantity of speech) were the dependent variables. Results found a significant multivariate effect for age,  $F(3, 147) = 3.12, p = .03$ ; Wilks'  $\lambda = .94$ ;  $\eta_p^2 = .06$ . Older adults scored higher ( $M = 13.92, SD = 4.36$ ) than young adults ( $M = 12.19, SD = 3.21$ ) on tangentiality;  $F(1, 149) = 7.14, p = .01, \eta_p^2 = .05$ . Similarly, older adults scored higher ( $M = 18.01, SD = 3.45$ ) than young adults ( $M = 16.82, SD = 3.06$ ) on egocentrism,  $F(1, 149) = 4.76, p = .03, \eta_p^2 = .03$ . No significant age differences were detected on quantity of speech.

Next, we added impulsivity (i.e., CPT-3 commission errors) and inattentiveness (i.e., CPT-3 omission errors) in the model as covariates (i.e., a MANCOVA). Assumption testing was conducted to check for normality, outliers, homogeneity of variance-covariance matrices, and multicollinearity of the covariates and no violations were found. Once impulsivity and inattention were included in the model as covariates, age cohort no longer had a significant multivariate effect:  $F(3, 141) = 1.72, p = .17$ ; Wilks'  $\lambda = .97$ ;  $\eta_p^2 = .04$ . After controlling for impulsivity and inattentiveness, no significant difference between young adults and older adults was found on the dependent variables tangentiality [ $F(1,143) = 3.85, p = .05$ ], egocentrism [ $F(1,143) = 3.15, p = .08$ ], or quantity of speech [ $F(1,143) = .24, p = .63$ ]. See Table 1 for MANCOVA results. When considered separately, the only dependent variable that resulted in moderate significance was the tangentiality variable when controlling for omissions;  $F(1,143) = 4.23, p = .04$ .

## **Discussion**

The purpose of this study was to investigate the relationship between neurocognitive functioning and OTV in young adults and older adults. This study was novel in that it was the first to use a lengthy, computer-administered measure of sustained attention and impulsivity (i.e., the CPT-3). Consistent with prior research, older adults displayed higher levels of OTV than young adults (Arbuckle & Gold, 1993; Glosser & Deser, 1992; James, Burke, Austin, & Holme, 1998; Juncos-Rabadan, Pereiro, & Rodriguez, 2005). Specifically, older adults displayed higher levels of the tangentiality and egocentrism facets of OTV, but no age cohort differences were found regarding quantity of speech; the lack of differences regarding quantity of speech is consistent with some previous research (Cooper, 1990; Hummer, 1994) and inconsistent with other studies (Arbuckle, Nohara-LeClair, & Pushkar, 2000).

After controlling for impulsivity and inattention, there were no longer significant age cohort differences on OTV. This suggests that both impulsivity and inattention may mediate age differences in OTV. These results are similar to the literature in which OTV has been linked with attention and inhibition (Jenson, 2012; Ying & Peng, 2016). However, the use of a continuous performance measure allows the analysis of both omission errors (i.e., inattention) and commission errors (i.e., impulsivity) on the same task. Thus, considering the facets of OTV individually, inattention (i.e., CPT-3 omission errors) was a significant univariate covariate of age cohort differences for higher tangentiality of speech. This suggests that inattention may play a distinctive role in age differences in tangentiality of speech.

Although this study has meaningful implications regarding age cohort differences in OTV, it was limited in several ways. The samples were small and were convenience samples that may not entirely represent the population for either age cohort. For example, both samples were majority female. Furthermore, the young adult and older adult samples were not matched on any variables and thus may not be equivalent in comparison. For example, 34.4% of the young adult sample and 71% of the older adult sample was Caucasian. This may be particularly relevant for education. The young adult sample was a college sample, whereas the older adult sample had a wider range of years of education.

Chapter 5

Conclusions and Recommendations

Future research should aim to conduct a similar study using sustained attention in a larger sample with matched education levels. In addition, larger studies should be done in more diverse regions to elucidate if the observed age cohort differences vary among ethnicities. Finally, future studies of OTV should include a condition in which speech samples have no time limit to shed more light on the quantity of speech facet.

In conclusion, this study utilized a measure of sustained attention in order to elucidate the relationship between age cohort, neurocognitive functioning, and OTV. The results of the study support the notion that, consistent with the inhibitory deficit hypothesis (Hasher & Zacks, 1988), impulsivity may play a role in age cohort difference in OTV; older adults may have greater OTV because they have greater difficulty inhibiting irrelevant information. However, the results of this study also suggest that inattention – when measured with a lengthy measure of sustained attention – may play a role in age-related OTV, particularly regarding the facet of tangentiality. Thus, age differences in OTV may also stem from older adults having difficulty sustaining their attention on a particular conversational topic over time.

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Table 1: Multivariate Analysis of Covariance Looking at Main Effect of Combined Covariates and Between Subjects Effects of Singular Covariates

| Dependent Variables |                    | <i>F</i><br>( <i>df</i> = 1,<br>143) | $\eta_p^2$ | Young Adults                        | Older Adults                        |
|---------------------|--------------------|--------------------------------------|------------|-------------------------------------|-------------------------------------|
|                     |                    |                                      |            | ( <i>n</i> = 61)<br>M ( <i>SD</i> ) | ( <i>n</i> = 86)<br>M ( <i>SD</i> ) |
| Tangentiality       | <b>Main Effect</b> |                                      |            | 12.30 (3.19)                        | 13.84 (4.36)                        |
|                     | Age                | 3.85                                 | .026       |                                     |                                     |
|                     | <b>Covariates</b>  |                                      |            |                                     |                                     |
|                     | CPT-O              | 4.26 *                               | .029       |                                     |                                     |
| Egocentrism         | CPT-C              | 1.81                                 | .01        |                                     |                                     |
|                     | <b>Main Effect</b> |                                      |            | 16.85 (3.06)                        | 17.97 (3.48)                        |
|                     | Age                | 3.15                                 | .02        |                                     |                                     |
|                     | <b>Covariates</b>  |                                      |            |                                     |                                     |
| Quantity            | CPT-O              | 1.44                                 | .01        |                                     |                                     |
|                     | CPT-C              | 1.10                                 | .008       |                                     |                                     |
|                     | <b>Main Effect</b> |                                      |            | 18.05 (4.72)                        | 18.26 (5.15)                        |
|                     | Age                | .24                                  | .002       |                                     |                                     |
|                     | <b>Covariates</b>  |                                      |            |                                     |                                     |
|                     | CPT-O              | .05                                  | <.001      |                                     |                                     |
|                     | CPT-C              | 1.11                                 | .008       |                                     |                                     |

CPT-O: Omissions (inattention) on the CPT-3.

CPT-C: Commissions (impulsivity) on the CPT-3.

\**p* < .05

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