Picture description is frequently used for eliciting narrative discourse samples from adults across the adult lifespan as well as from clinical populations. Stimuli include single pictures and/or picture sequences. Picture description has advantages over purely spontaneous tasks because it provides a standardized approach to language sampling (Cooper, 1990) and allows for performance comparison within and across groups (Mackenzie, Brady, Norrie, & Poejianto, 2007). Picture description tasks have been used to investigate both within-sentence and between-sentence linguistic processes. Of relevance here are those studies that have used picture description to investigate between-sentence processes in healthy adults; more specifically, an individual's ability to relay main ideas depicted in pictorial scenes.

Results of studies investigating the ability to relay main ideas in healthy adults have yielded conflicting results. Some researchers have reported no effect of age on the ability to relay main ideas in response to single pictures (Capilouto, Wright, & Wagovich, 2005; Cooper, 1990; Mackenzie, 2000) hypothesizing that picture description tasks may not tax participants' memory and attention processes to the extent hypothesized for complex communication tasks such as conversation (Mackenzie, 2000). Other researchers have demonstrated age-related differences in the ability to relay main ideas from both single and sequential pictures (Duong & Ska, 2001; Marini, Boewe, Caltagirone, & Carlomagno, 2005) hypothesizing that weakened working memory capacity in older participants could account for the significant differences observed between age groups (Marini, et al., 2005).

Despite conflicting results, researchers have consistently implicated cognitive processes as mediating linguistic demands for narrative discourse production; however, measures of cognitive function have not been included. Findings may have implications for how cognitive processes interact with discourse processes and may be useful for investigating the relationships among discourse and cognitive processes in clinical populations. The present study was designed to investigate two aims: (1) if narrative production elicited from picture description, as measured by the proportion of main events (ME), varies across the life-span; and, (2) the role memory and attention play in such tasks.

Method

Two-hundred forty cognitively healthy adults across six age cohorts (20-70), with 40 participants per cohort participated and met the inclusion criteria: (1) hearing within functional limits; (2) Native English speakers by report; (3) negative history for cognitively deteriorating conditions; (4) aided or unaided visual acuity within normal limits; (5) no depression at the time of the experiment; and (6) no previous neurological condition per report (see Table 1).

Standardized measures of memory and attention included the Wechsler Memory Scale-III (WMS-III; Weschler, 1997), Comprehensive Trail Making Test (CTMT; Reynolds, 2002), and STROOP Color and Word Test (STROOP; Golden, 2002). Working and episodic memory abilities were estimated from performance on the WMS-III. Attention abilities were estimated from the CTMT and STROOP. Participants provided a language sample in response to Nicholas and Brookshire's (1993) two single pictures and two picture sequences. Each sample was evaluated for the proportion of ME relayed. The ME measure was developed for use with Nicholas and Brookshire's (1993) picture stimuli (Capilouto et al., 2005). *A priori* main events are compared to those produced by participants; the measure has been shown to be valid and reliable (Wright, Capilouto, Wagovich, Cranfill, & Davis, 2005).

Samples were orthographically transcribed from audio or video recordings and analyzed for proportion of main events by trained research assistants. Ten percent of the transcripts were randomly selected for a second transcription and for scoring main events to determine inter-rater and intra-rater agreement. All transcription and scoring agreements were greater than 90%.

Results

One-way ANOVA indicated no significant difference between cohorts for proportion ME, regardless of stimulus. However, comparing 70 year-olds against all other cohorts combined, yielded a significant difference in proportion ME for single stimuli, $t(233)=2.28$, $p=0.02$; the 70 year-olds relayed significantly fewer ME. Participants conveyed a significantly greater proportion ME for sequential stimuli as compared to single stimuli, $t(234)=10.9$, $p < 0.0001$ (see Table 2).

ANCOVAs were performed to investigate the relationship between age and cognition on proportion ME, with cohort as the between subjects factor and all other independent variables as covariates. The primary analysis involved two models (one for single and one for sequential) with all two-way interactions of cognitive measures and cohort included. For single pictures, only our estimate of episodic memory was significant, $F(1,223) = 10.71$, $p = 0.001$. A significant interaction between STROOP and cohort, $F(5,223) = 2.58$, $p = .03$ was found for sequential stimuli only (see Table 3).

To further investigate the interaction, a plot was constructed with individual regression lines representing the relationships between the proportion of ME relayed for the sequential stimuli and the STROOP score, by cohort. Younger cohorts (20's, 30's, and 40's) demonstrated a positive relationship between STROOP and proportion of ME; as STROOP accuracy increased so did proportion of ME. The older cohorts (50s, 60's and 70's), demonstrated a weak relationship between STROOP and sequential total; regression lines for these groups were almost flat (see Figure 1).

Discussion

The present study was designed to investigate two aims: (1) if narrative production elicited from picture description, as measured by the proportion of main events (ME), varies across the life-span; and, (2) the role memory and attention play in such tasks. No significant difference in the proportion of ME relayed was detected among age groups, regardless of stimulus. Despite the absence of a linear trend, results indicated that the oldest cohort produced a significantly lower proportion of main events when compared to all other cohorts, for the single picture stimuli. These results support findings of other researchers who have reported that the ability to communicate main ideas is susceptible to the effects of aging by 70 years-old (Mackenzie, et al., 2007; Marini, et al., 2005). These results further extend findings to include the *absence* of an age-related decline in the ability to relay main ideas for sequential stimuli. The finding that sequential picture stimuli are not sensitive to age differences suggests that such stimuli may be more appropriate than single pictures for documenting change in language production ability as a result of language impairment.

With respect to the second aim, results of this study suggest that memory and attention abilities influence picture description narrative production to a greater extent than previously thought. The significant finding relative to our estimate of episodic memory, suggests that the single pictures required participants to acquire and maintain new information to an extent not required by the sequential stimuli and not differentially dependent on age. Our results also indicate that selective attention, as measured by STROOP, plays a role in the ability to relay main ideas, when sequential stimuli are used; and, the relationship is influenced by age. Consequently, for persons with acquired communication disorders, specific cognitive abilities could have a greater impact on picture description performance depending on the age of the individual and/or the type of task. For example, episodic memory abilities may have an impact on picture description performance, especially when single pictures stimuli are used and the influence of selective attention on sequential picture description may vary depending on age. This information is useful for providing insight into the possible relationships between common language elicitation tasks (i.e. picture description) and cognitive processes known to be susceptible to aging and injury, such as memory and attention.

Table 1. Reported Means and (standard deviations) of Demographic Variables of Interest, by Cohort (N = 40 per cohort)

	Age Group Cohorts					
	20s	30s	40s	50s	60s	70s
M:F	20:20	15:25	20:20	20:20	13:27	15:25
Age	24.5 (2.8)	33.8 (2.9)	44.3 (3)	53.3 (2.6)	65.1 (2.7)	73.4 (2.8)
Educ	15.9 (1.8)	16.7 (3.6)	15.6 (2.7)	16.3 (2.6)	16 (2.9)	15.7 (2.5)
MMSE[1]	55.7 (6.7)	53.0 (8.9)	52.4 (5.6)	52.6 (4.4)	57.2 (5.4)	58.7 (7.7)
GDS[2]	1.4 (1.4)	1.05 (1.2)	1.02(1.1)	.9 (1.3)	.87 (1.1)	.78 (1.0)

[1]MMSE: Mini Mental State Exam Scaled Score; [2]Geriatric Depression Scale- Short Version

Table 2. Means and (standard error) for Proportion of Main Events Relayed for Single and Sequential Stimuli, by Age Group

	Proportion of Main Events Relayed	
Age	Single Picture Total	Sequential Picture Total
20 – 29 (N = 39)	0.51 (0.16)	0.62 (0.15)
30 – 39 (N = 39)	0.49 (0.17)	0.62 (0.20)
40 – 49 (N = 39)	0.49 (0.17)	0.66 (0.17)
50 – 59 (N = 40)	0.52 (0.19)	0.62 (0.15)
60 – 69 (N = 40)	0.52 (0.13)	0.62 (0.13)
70 – 79 (N = 38)	0.44 (0.13)	0.58 (0.13)

Table 3. Reported Means and (standard deviations) for Cognitive Measures, by Age Group

	Age Group Cohorts					
	20s (N = 39)	30s (N = 39)	40s (N = 39)	50s (N = 40)	60s (N = 40)	70s (N = 38)
GM Raw[1]	172 (17.6)	175.2 (19.2)	171.9(19)	168.4(19)	160.2(19)	155.1(18.3)
WM Raw[2]	28.9(3.5)	29.4(5.6)	27.9(4.5)	27.5(4.3)	24.7(3.4)	23.8(4.7)
STROOP C-W[3]	49.2(9.6)	48.2(10.8)	43.1(13.1)	43.9(8.6)	41.1(13)	34.1(9.3)
CTMT Trail 5[4] (in sec)	45.4(10.3)	46.1(19.6)	54.5(22.8)	53.1(19.5)	64.9(23)	79.2(20.5)

[1]Wecshler Memory Scale-III General Memory Raw Index Score – maximum raw score is 224;

[2]Wecshler Memory Scale-III Working Memory Raw Index Score – maximum raw score is 53;

[3]STROOP Color-Word Subtest Raw Score; [4]Comprehensive Trail Making Test Trail 5 Raw Score reflects time in seconds

Figure 1. Plot of the Proportion of ME Relayed for Sequential Stimuli and the STROOP Accuracy Score, By Cohort

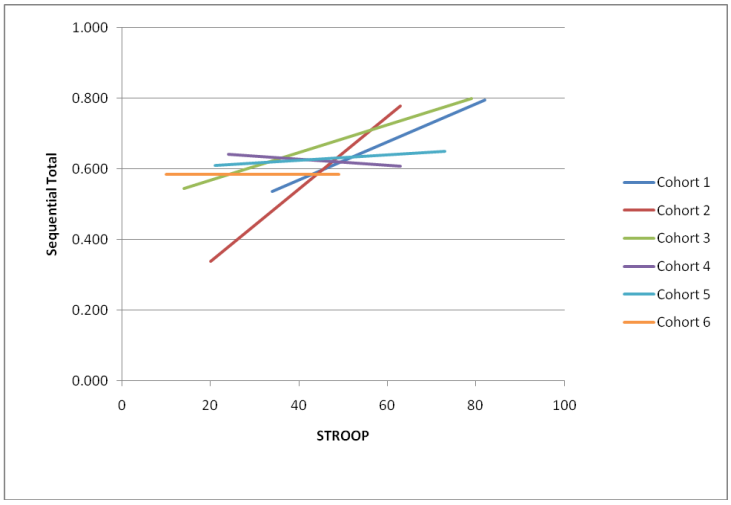

Figure 1. Cohort 1 represents 20-year olds; Cohort 2 represents 30-year olds; Cohort 3 represents 40-year olds; Cohort 4 represents 50-year olds; Cohort 5 represents 60- year olds, Cohort 6 represents 70-year olds.