

The Impact of Aging on Emotion in Language Production

It has long been assumed that older adults experience diminished feelings of well-being due to the deterioration of their physical and mental health. Research has actually demonstrated, however, that the ratio of positive to negative emotion improves through the life span. Mroczek and Kolarz (1998) point out that “well-being seems to be unaffected by the adverse contexts brought on by the aging process” (p. 1333), with older adults reporting less anxiety and greater contentment than their younger counterparts (Charles, Reynolds, and Gatz, 2001).

The paradox of well-being, or the “presence of subjective well-being in the face of objective difficulties... that intuitively should predict unhappiness” (Mroczek et al., 1998, p. 1333) has been widely established in current aging research. Positive and negative affect have also been found to be only slightly correlated, and are often not linked to the same events, so changes in emotion are best understood when the two are examined on different dimensions (Charles et al., 2001). These promising findings show that old age doesn't correlate with diminished well-being, and, in fact, subjective happiness may increase with age.

Although emotional well-being may not deteriorate with age, declines have been reported in the functioning of a number of cognitive abilities. Research has indicated that aging is responsible for declines in sustained attention, working memory, reasoning, visual-spatial perception, processing speed, and motor functions (Borod and Yecker, 2004). Other studies have reported deficits in “episodic memory...prospective memory, inhibition...‘executive’ function” (Braver and Barch, 2002, 809), and “sensorimotor coordination and language” (Carstensen, 2006, 1913). This decline in executive function

is associated with a deterioration of prefrontal brain regions, leading to deficits on attention and memory tasks requiring internal strategies, rather than just external cues (Mather and Carstensen, 2005).

There are mixed findings from studies that examine language production abilities; the resulting deficit or lack thereof depends on what aspect of language production is measured. Studies have consistently reported higher vocabulary scores for older adults, but these age-related performance advantages were eliminated when the higher education levels of older adults were taken into account (Verhaeghan, 2003). However, the same study found that even when controlling for education level, older adults were superior to younger adults at producing the definition of a target word. Some age-related declines in vocabulary scores have been reported for very old adults, but these studies show that, after taking cohort effects into account, 20-year-olds' scores were still lower than older adults' until the older adults reached their 80s (Alwin and McCammon, (2001)

The greater vocabularies of older adults are also evident when examining discourse; older adults produce more different words relative to total words than younger adults, referred to as type to token ratio (Kemper and Sumner, 2001). Relatively few age-related declines have been reported for semantic retrieval, except that older adults are sometimes found, under certain circumstances, to have slower speed of retrieval (Lindengerger and Baltes, 1997, Cameli and Phillips, 2000).

It is important to consider the impact of emotion on cognition, especially in the later years of life when emotional regulation reportedly is more robust and positive than in younger years, whereas cognitive function is experiencing area-specific declines. The impact of the emotional resilience on declining cognitive abilities may prove to be a

defining characteristic of language production and comprehension in older adults.

Language production is an especially important area in which to study the effects of emotional positivity in older adults, because the ability to be an effective communicator is crucial for meaningful interactions with others. It is also important when you consider the findings of Pennebaker and Graybeal (2001). They found that participants who wrote diaries about traumatic experiences in the lab for 15 to 20 minutes, just three consecutive days, enjoyed better health in the months after the experiment than those who wrote about superficial topics. In addition, those who wrote about traumatic experiences and used words suggesting causal thinking and self-reflection had fewer health problems than those who did not (Pennebaker, Mayne, and Francis, 1997). If older adults differ from younger adults in the frequency with which they produce causal thinking or reflection in their language, these differences may ultimately affect their overall health, and are interesting areas for investigation.

Aging and Emotion

The age differences that are found in processing emotion are evident in a range of domains, not just language. Studies on the recognition of emotion in facial expressions have found that older adults are less accurate at detecting negative emotions but equally as skilled at recognizing positive emotions as younger adults (Isaacowitz, Lockenhoff, Lane, Wright, Sechrest, Riedel, Costa, 2007) and hold emotion to be central in problem solving in interpersonal situations (Watson and Blanchard Fields, 1998). Watson and Blanchard Fields (1998) asked older and younger adults to rank, from most to least effective, a number of strategies for dealing with hypothetical interpersonal problem situations. The strategies differed in their focus, either emotion-focus or problem-focus,

and their orientation, either personal or concerned with the needs of others. All of the participants preferred the strategies that were problem-focused rather than emotion-focused, and other-oriented versus self-oriented. The older adults, however, preferred a mix of problem-focused and emotion-focused strategies, while the young and middle-aged adults preferred problem-focused only. This study nicely illustrates the changing role of emotion in problem-solving situations throughout the aging process.

Researchers usually define well-being as having three components: life satisfaction, positive affect, and negative affect. Socioemotional selectivity theory (SST) is relevant to the latter two aspects. This theory, proposed by Carstensen, Isaacowitz and Charles (1999), suggests that interpersonal relationships become more important with increasing age. It states that as people age the role of affect gains prominence, such that older adults gear their lives toward maximizing positive affect and minimizing negative affect. SST explains the finding that older adults are as happy, if not happier, than younger adults by postulating that older adults shift their goals and priorities to emphasize those aspects of their lives that bring satisfaction, such as enjoyable activities and important relationships.

Socioemotional selectivity theory argues that there are two competing groups of goals; those concerned with acquiring knowledge and information, and those surrounding the regulation of emotion. In situations in which time seems limitless, the goals of acquiring new knowledge take precedence. In contrast, when time is seen as limited, goals that can be accomplished more quickly, such as those concerning emotional states, take first priority. This theory helps explain differences between young and old people in situations in which goals compete, such as situations in which gaining new information

would necessitate unpleasant emotional experiences. Younger adults are willing to accept the negative emotional outcomes to gain the information, while older adults prefer to avoid negative emotional experiences and not learn the information.

This theory places great emphasis on the role of time horizons for motivation. Carstensen reports that goals and cognitive processes concerned with emotion change as time horizons shrink, which generally correlates with chronological aging. However, time horizons can be artificially induced, and in these experimental conditions age difference disappears. Disasters, such as the SARS epidemic in Hong Kong, were found to eliminate age differences on some aspects of motivation between young and old adults (Carstensen, 2006, 1914), with younger adults answering in a manner similar of older adults when they were in this mindset of potentially limited time. Older adults responded as younger adults when they were told, for example, they had many more years than they'd expected yet to live.

Memory for emotional material has shown consistent differences as a function of aging. Older adults, although having poorer memories than young adults in general, have been found to be more likely to remember the positive than negative pictures (Mather and Carstensen, 2003). Another study reported that older adults can actually outperform young adults when they are given a working memory task that involves positive stimuli (Mather and Carstensen, 2003). Brain scans also suggest that older adults process negative information less deeply than positive (Mather, Canli, English, Whitfield, Wais, Ochsner, Gabrieli, Carstensen, L., 2004): Amygdala activation appeared in young adults in response to positive and negative (as opposed to neutral) information, but in older adults the amygdala showed increased activation only in response to the positive images.

It is important to emphasize that the link between older age, memory, and emotion isn't general to all emotion, but is related to positive emotion in particular. Charles, Mather, and Carstensen (2003) found that although older and younger adults spent more time looking at negative images than positive or neutral ones, the older adults did not recall them better than the positive ones.

Kennedy, Mather, and Carstensen (2004) hypothesized that, according to Carstensen's socioemotional selectivity theory, older adults are more motivated than younger adults to remember their past in emotionally gratifying ways. To test this theory, they manipulated emotional states while having their older adult respondents retrieve personal information they'd provided 14 years prior. During retrieval the control group was focused on accuracy, while the testing group was induced into an emotion-focus state. They then divided both the control and experimental groups by age, 47 to 65 years of age, and 79-101 years of age. The authors found that both groups of older old adults remembered the past more positively than they had originally reported it, while both groups of younger old adults remembered the past more negatively than they'd originally reported. These results provide convincing evidence for the Socioemotional Selectivity Theory, because a clear shift from a negative memory effect to a positive memory effect is evident in the comparison of the younger control group and the older control group, suggesting that the older old adults are utilizing emotion-regulation strategies while the younger old adults are not.

Mather and Carstensen (2003) also provide evidence that older adults have a bias toward attending to and remembering positive information. They reported that older adults were significantly faster to respond to a dot that was in the position where a

positive face had been compared to a dot where a negative face had been. There was no significant effect of emotion for the younger participants. The participants were also given a recognition memory task for the faces they had viewed, and the older adults were significantly better at remembering positive rather than negative faces, while again there was no difference found for the younger adults.

Emotion and Individual Factors

Other factors may play a role in the effect of aging on emotion processing and physical health. One of the most well-known findings is that low conscientiousness, high neuroticism and low extraversion, indicators of low levels of positive emotion, are predictors of an above-average mortality risk, suggesting that within an age group there may be significant differences in positive emotion based on personality traits. Mroczek and Spiro (2007) challenged the stability of neuroticism and extraversion, and questioned how changes in them would affect mortality risk over an 18-year period in a group of men. They hypothesized that a decrease in neuroticism over time would lead to a reduction in mortality risk, and an increase in extraversion would have the same effect. These traits are both linked to emotion, as individuals who are high in neuroticism experience high levels of negative emotions. No significant effect of extraversion on mortality was found, but it was determined that men who had high neuroticism and an increase of neuroticism over time had the highest mortality of all the participants (Mroczek and Spiro, 2007, 374).

Chapman, Duberstein, Sorenson, and Lyness (2007) examined the stability of gender differentiation of neuroticism and agreeableness. Women in college and adult samples in 26 different nations have been found to have higher scores on these two traits

than men. A high neuroticism score indicates a propensity toward negative emotions and feelings of distress, while high agreeableness is linked to positive outcomes such as altruism, trust, and compliance. These researchers found that women scored moderately higher on neuroticism and agreeableness than the men, consistent with findings of men and women at younger ages (Chapman et al., 2007, 1598). Gender differences were also found by Watson and Blanchard-Fields (1998), who reported that women were less likely to use self-centered approaches to problems than men, and were more likely to report negative emotions (237).

Mroczek and Kolarz (1998) found that, in line with the trend of research in this area, youngest adults had the highest levels of negative affect, as measured by the Midlife Development Inventory, while older adults had the lowest. They also reported a gender difference, however; positive affect was in the form of an accelerating curve for women, and was linearly associated among men. They proposed that “particular combinations of age, personality, and sociodemographic categories may maximize or minimize happiness” (p. 1345), as the participants in their study who were found to be extraverts had high levels of positive affect at all ages. Extraversion, intelligence, and size of social group were found by Isaacowitz and Smith (2003) to predict positive affect in their young-old group, but only extraversion was found to be predictive of positive affect in their oldest participants.

Mroczek (2001) provided a good overall summary: “positive affect was higher for men than for women, for married people than for single people, for extraverts than for introverts, and for people in good physical health than for those in poor health; also, positive affect was inversely related to stress and neuroticism” . Above and beyond this

set of influences, however, older adults still report more positive and less negative affect than those in middle or young adulthood.

Language and Emotion

Age-related declines have been observed in some aspects of language production of older adults. Kemper, Thompson, and Marquis (2001) established that the grammatical complexity and propositional content of oral language begin to decline in healthy older adults between ages 74 and 78. Kemper, Herman, and Liu (2004) confirmed these earlier findings in a study requiring older and younger adults to produce complex sentences under controlled conditions. They asked the study participants to memorize different sentence stems that differed in complexity, then to produce a sentence utilizing the stem. The older adults also created more nonfluent responses, sentence fragments, and anomalous sentences than the younger participants. The authors suggested that working memory limitations might be to blame, causing older adults' sentences to have a limit on complexity.

Some researchers examining speech patterns of older and younger adults have found that older adults tend to produce more off-topic speech than younger adults (Arbuckle & Gold, 1993), suggesting older adults have a general deficit inhibiting irrelevant information. James, Burke, Austin, and Hulme (1998), however, found this to be true only under certain conditions. They reported that older adults were more off-topic than younger adults when generating speech describing personal topics but not for picture descriptions. They also reported that older speakers were generally rated as more talkative than younger speakers, but their stories were considered more interesting, informative, and of higher quality. These findings suggest that older adults use more off-

topic speech for personal topics because they have different communicative goals than younger adults, a conclusion supported by the discovery that the older adults are not generally more verbose, but only when speaking on specific autobiographical topics.

Many studies have examined the ways in which older and younger adults differ in their uses of speech when communicating with other people. Pasupathi, Henry, and Carstensen (2002) examined studies that measured storytelling, and found that some have indicated older adults tell less coherent stories, while others have shown that although older adults' stories may be less grammatically complex, they contain as much meaning and have more effective structure than those stories told by younger adults. However, very little research has examined the emotional content of these stories. Pasupathi et al. (2002) explored this new area of study, by asking older adults to tell two stories to children, one based on a storybook with pictures but no words, and the other a story they made up entirely. They found that, for both story types, older adults' stories were less negative than younger adults, supporting their hypothesis that older adults have increased emotion regulation. No difference was found between the older- and young- adults' stories on positive emotion.

This finding is consistent with Pennebaker and Stone (2003), who examined text samples from over 3,000 participants in various emotional disclosure studies. The transcripts and writings in their studies were examined with a computerized text analysis program, Linguistic Inquiry and Word Count (LIWC). This program searches a document for words and word stems which have been categorized on 70 linguistic dimensions, including language categories such as articles or prepositions, psychological

categories such as positive and negative emotions, and content dimensions such as work or death.

All of these writings or transcripts Pennebaker & Stone selected were about emotional experiences the participants had experienced; each participant's sample was 1,151 words on average. Laboratories in the United States contributed data from 40 studies, data from 4 studies came from New Zealand, and 1 study's data was collected from England. More than half of the data came from females, and the participants ranged in age from 8 to 85, with an average age of 23.8. The authors found that aging was associated with a greater use of positive emotion words and fewer negative emotion words, as well as increase in the use of present and future-tense verbs. The shift in verb-tense found is interesting, because it is counter to the hypothesis proposed by the authors. The verb-tenses favored by older adults suggest they are anchored in the present and future, contrary to the past-focus the authors anticipated.

Pennebaker & Stone (2003) also examined the works of 10 famous authors across their life spans. The works spanned a wide age range, included both men and women's writings, and came from different genres. If one of the authors wrote in several different genres, works from their most prominent genre were the ones analyzed. Five correlations between a LIWC measure and age were significant: first-person singular, future-tense verbs, total cognition words, insight, and exclusive. As they aged, these authors used fewer first-person singular words and more future-tense verbs, cognitive words, insight and exclusive words. Twelve of the 14 correlations for the author study were in the same direction as at least one condition (control or experimental) of the earlier disclosure study. There was no significant finding on the correlation of positive or

negative emotion words with age in the Author study, but positive emotion was positively correlated with age in the experimental disclosure condition. Negative emotion was significantly positively correlated with age in the control condition of the disclosure study, and negatively correlated with age in the experimental condition, while again it did not reach significance in the author study.

Method

Experiment 1A

Participants. We tested 20 college students ($M = 20.3$ years, 12 men and 8 women) and 20 healthy older adults ($M = 71.25$ years, 13 women and 7 men). The mean score on the Shipley Vocabulary Test (maximum score = 40) was higher for older ($M = 36.50$) than younger ($M = 34.70$) participants, $t = 2.03$, $p < .05$. Years of education were greater for older ($M = 17.7$) than younger ($M = 14.4$) adults, $t = 4.56$, $p < .00$. Not included in this sample were 3 older adults and 3 younger adults. Two of the older adults were excluded because they scored too poorly on the Mini-Mental State Examination, and the third was excluded for not properly following directions. One of the younger adults was excluded because of an equipment malfunction, and the other two were excluded because of concerns about their ability to complete the task. All of the participants were native speakers of English and were paid for their participation.

Materials. Pilot testing was used to choose which 5 photos should be used out of a set of 10. The pictures were selected from the International Affective Picture System set, and all featured people in emotionally neutral context and with neutral expressions on their faces. The pictures were chosen out of the set of those that were rated as neutral for

affect and valence, and featured a person. 8 young adults participated in the pilot testing, and the format of pilot testing was identical to that of the experiment. The experiment participants were shown 5 pictures, and were instructed to make up a story about each of them. One of the pictures featured a man and a woman, and the other 4 featured individuals, 2 women and 2 men. All of the pictures were presented as color photocopies. See figures 1 and 2. The participants completed the Shipley Vocabulary Test, and the older participants received a Mini Mental State Examination. They all completed a questionnaire about age, sex, education level, current state of well-being, and medications. All sessions were recorded by an audio recorder which was placed on the table.

Procedure. Participants were tested individually by one female experimenter (aged 21 years old, with 15 years of education) in one of two testing rooms, each of which had a comfortable seating area. . The participants first completed the personal information questionnaire, Shipley vocabulary test, and Mini Mental, if applicable. The participants were informed that they would be shown 5 pictures, and that they should make up a story about each of them, taking about 3-5 minutes to tell it. Special emphasis was placed on instructing the participants to make up a story rather than just describe the picture. They were told the stories should be fiction, but could reflect events they had experienced if they wished. They were also read the following questions, to help them think of a story: “What is happening? Who are the people? What has led up to this situation? What are the feelings of the person or people?” The participants were then given the first picture, and were told they could take as much time as they wished to plan their story. The order of the pictures was changed after the first 10 older and 10 young

participants. The experimenter did not respond verbally during the story-telling, unless she was explicitly asked to clarify the directions.

Scoring. The stories told by all of the participants were recorded, and then transcribed verbatim. The transcriptions were necessary to determine word count of the stories, and the percentages of positive and negative words in each story.

Word counts and positive and negative word percentages were obtained using the online version of Linguistic Inquiry and Word Count, a text analysis software program. Two experimenters then calculated the number of fillers, repetitions, stutters, and metalinguistic comments made in each story. Fillers such as “um”, “uh”, and “like” were excluded as well as any comments the participants made that were not a part of the story, for instance, “What is your name again?”. The two experimenters were female, 23 and 20 years old, with 16 and 15 years of education, respectively. Both experimenters independently examined each story for fillers, metalinguistic comments, and repetitions. Inter-coder agreement was 99.7%, for the total of 3,453 words excluded. New versions of the stories were then made with all of these words excluded, and the stories were again run through the LIWC software to determine word counts and percentages of positive and negative words. Discrepancies rarely occurred during the comparison of coding, but those that did were results of disagreements about whether comments were metalinguistic or not. All discrepancies were resolved through dialogue before the final versions of the stories were created.

Experiment 1B

Participants. We tested 20 college students (11 men and 9 women, $M = 18.75$) and 20 healthy older adults ($M = 73.70$, 14 women and 6 men). The mean score on the

Shipley Vocabulary test (maximum score = 40) was higher for older adults ($M= 35.65$) than younger adults ($M= 33.15$), $t= 2.12$, $p< .04$. Years of education were also higher for older adults ($M = 16.00$) than young ($M= 12.45$), $t= 5.20$, $p< .00$. These participants exclude older and two young adults. One of the older adults was excluded for not following the correct procedure, and the other was excluded because of inability to finish the experiment. One of the young adults was excluded for being out of the age range, and the other was excluded because of medication.

Materials. Participants were given a packet of 50 stories. Because there were 200 stories, 4 different packets were made, and each was read by 5 older and 5 younger participants. The packets had 25 stories from younger adults and 25 stories from older adults, and all steps were taken to make the packets be comparable lengths. Each story was presented on its own page. The participants were also given a grading sheet to mark the emotionality of the stories. The sheet had two 1-5 scales on which to mark positive emotion and negative emotion for each story. The participants completed the Shipley Vocabulary Test, and the older participants received a Mini Mental State Examination. They all completed a questionnaire about age, sex, education level, current state of well-being, and medications, and their eye-sight was also tested.

Procedure. Participants were tested individually by one of two female experimenters (21 years old, 15 years of education) and (20 years old, 14 years of education). The participants completed the personal information questionnaire, Shipley vocabulary test, and Mini Mental, if applicable. The experiment took place in one testing room, which had a comfortable seating area. The participants were given one of the four packets of 50 stories. They were also given the packet of paper on which the ratings for

each story were to be written. The experimenter explained to the participants that she was interested in how positive and negatively emotional they thought each story was. The participants were instructed to read each story, and then mark on the rating packet how positive they thought the story was and how negative they thought the story was. Each rating (positive and negative) had its own scale of 1-5, with 1 being none of that emotion and 5 being a great deal of that emotion. They were reminded that a story could be both very positive and very negative, not at all positive and not at all negative, or any other combination of the two. The participants were given as much time as they needed to complete the rating, but were given a break after the first 25 stories to complete another short task before continuing with the second half of the stories.

Scoring

The participants' positive and negative ratings for all stories were entered into an SPSS file. The ratings were averaged for each storyteller, and then averaged for the age group of the storyteller, so each rater had 4 scores: older positive average, young positive average, older negative average, and young negative average.

Results

Experiment 1A

The number of words for each participant was averaged across the five stories, so the participants all had one average score of word count. The overall average word count for older adults' stories was 2,695.20 words, and the overall average word count for younger adults was 4,474.80. A two-way ANOVA comparing age (young, old) and emotion words (positive, negative) found a main effect of valence, in that both younger and older adults used higher percentages of positive emotion words than negative

emotion, $F(1,38) = 44.06, p < .00$. A main effect of age was also found, in that older adults used more emotion words overall than younger adults, $F(1,38) = 380.99, p < .00$. There was also a valence by age interaction, $F(1,38) = 4.43, p < .04$; the age difference in percentage of words was greater for positive than negative emotion words. Older adults produced a greater mean percentage of positive emotion words ($M = 2.44$) than the young adults ($M = 1.76$), $t = 2.58, p < .014$. There was no age difference found in mean percentage of negative words ($M = 1.00$ and $M = 1.02$ for older and young adults, respectively). See figures 3 & 4.

Experiment 1B

The results from the participants' ratings were analyzed using a 3-way ANOVA, with rater age (young, older), storyteller age (young, older) and rating (positive, negative) as variables. There was a main effect of rater age such that older adults rated stories as more highly valenced (positively and negatively) than younger adults, regardless of storytellers age, $F(1,38) = 14.98, p < .00$. There was also a 2-way interaction, $F(1,38) = 16.31, p < .00$, indicating that all raters found stories of older adults to be more positive than those of young storytellers, M ratings = 2.78 and 2.54, respectively, $t(39) = 2.7, p < .01, df = 39$. The stories of young storytellers were also rated more negatively $M = 2.79$ than the stories of older adults $M = 2.4, t(39) = 4.23, p < .00$. There was no 3-way interaction found. See figure 5.

Discussion

Previous research on the interaction between emotion and aging has focused largely on attention and memory, but not much research has looked at differences in positive and negative emotion in language production. Socioemotional Selectivity Theory

presents the idea that as adults age their motivations and goals shift from knowledge acquisition to emotional fulfillment, and this shift can be observed through the examination of differing styles of linguistic expression, specifically the emotional quality of stories. This study examined how older and younger adults would choose to form a story when presented with the same neutral stimuli.

As hypothesized, older adults produced a greater mean percentage of positive emotion words in their stories than did young adults. This difference was found through computer count of emotion words, and by human raters of the emotional valence of the stories as a whole.. The mean percentage of negative emotion words didn't differ significantly between young and older adults when stories were analyzed with computer software, but a difference in the negativity ratings of the stories of younger and older adults was found when the stories were rated by humans. There was an interaction found in the human ratings such that older storytellers were rated as more positive and less negative than younger storytellers.

These findings support the basic claims of SES; that as adults age they become more interested in regulating their emotions, and thus are likely to increase positive emotionality and limit negative emotionality. This was shown in this study through the older adults' greater production of positive emotion words when given the same neutral picture stimuli as younger adults. Another interesting finding of this study is that the older adult raters also reported more positive and negative emotion in all of the stories than did the young adults. This suggests they are more attentive to the emotional quality of the material than the younger adults, and thus report both positive and negative emotions more readily than do young adults. These findings are consistent with the

predictions of SES, as it shows that older adults are more highly motivated to attend to emotional stimuli. These stories are ideal for testing the motivations underlying SES because they provide an opportunity for influence of goals that may not happen with other experimental techniques.

A previous study on storytelling (Pasupathi et al. 2002) produced a different finding; older adults' and young adults' stories didn't differ in their levels of positive emotion, but older adults' stories contained less negative emotion. It is possible that this finding can be attributed to the audience the older and young adults were addressing. As opposed to this study, the participants in Pasupathi et al. (2002) were directing their stories toward children. It is possible that older adults and young adults alter their storytelling style when they are addressing different age groups, which would help explain why the current study found a difference in positive emotional content but not negative.

While this study was useful in determining how older and young adults choose to interpret neutral stimuli, it does not provide insight into how these two groups would choose to tell a story about positive or negative stimuli. An interesting extension of this story could include pictures with a negative feature, which participants would have to include in their story. One might expect that young adults would choose to feature this negative aspect more prominently in their stories than older adults, who might make this feature only a small part of their stories.

Graphs and Figures



Figure 1



Figure 2

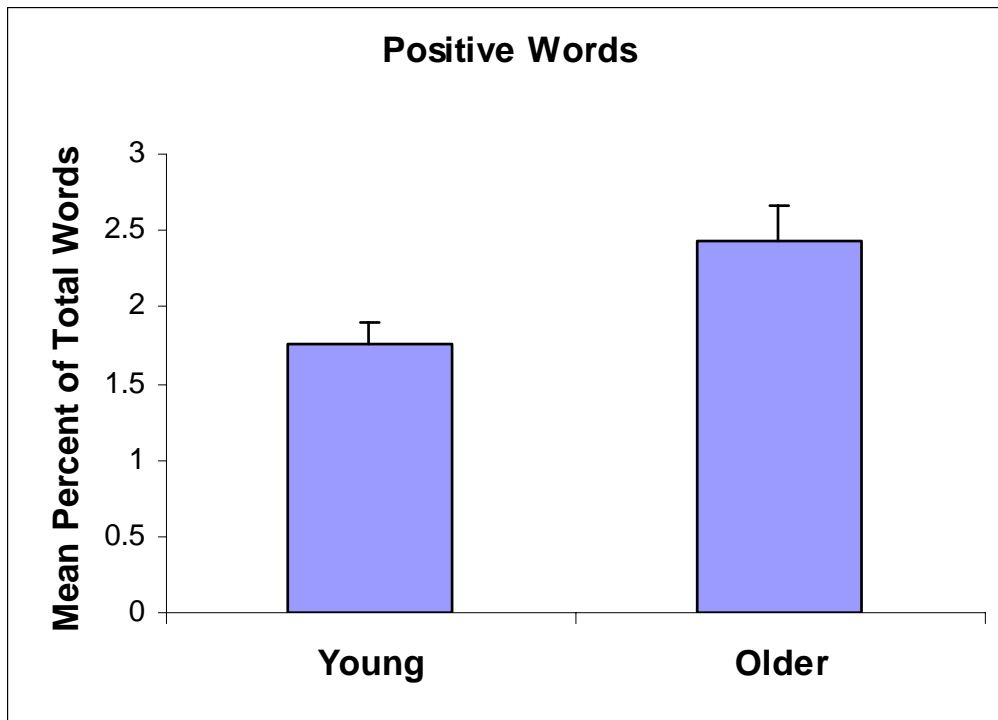


Figure 3

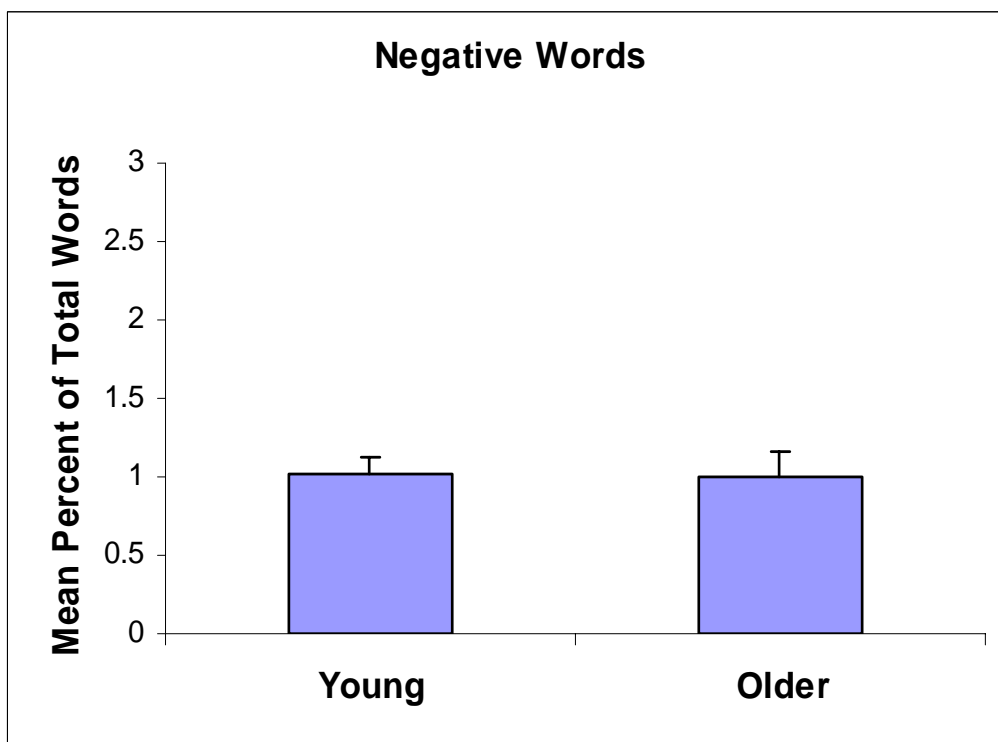


Figure 4

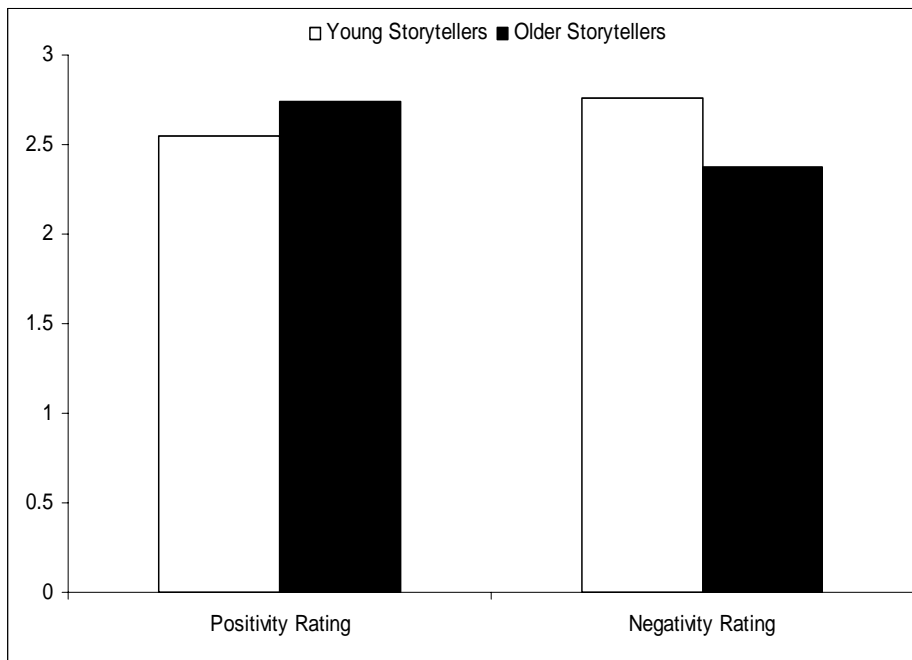


Figure 5

Bibliography

- Alwin, D. F., McCammon, R. J. (2001). Aging, cohorts, and verbal ability. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 56, 151-161.
- Arbuckle, T. Y., & Gold, D. P. (1993). Aging, inhibition, and verbosity. *Journal of Gerontology: Psychological Sciences*, 48, 225-232.
- Baltes, P. B., & Lindenberger, U. (1997). Emergence of a powerful connection between sensory and cognitive functions across the adult life span: a new window at the study of cognitive aging? *Psychology and Aging*, 12, 12-21.
- Cameli, L., & Phillips, N. A. (2000). Age-related differences in semantic priming: evidence from event-related brain potentials. *Brain & Cognition*, 43 (1-3), 69-73.
- Borod, J. C., Yecker, S. A., Brickman, A. M., Moreno, C. R., Sliwinski, M., Foldi, N.S., Alpert, M., Welkowitz, J. (2004). Changes in posed facial expression of emotion across the adult life span. *Experimental Aging Research*, 30, 305-331.
- Braver, T. S. & Barch, D. M. (2002). A theory of cognitive control, aging cognition, and neuromodulation. *Neuroscience and Biobehavioral Reviews*, 26, 809-817.

- Carstensen, L. L. (2006). The influence of a sense of time on human development. *Science, (312)*, 1913-1915.
- Carstensen, L. L., Isaacowitz, D. M., Charles, S. T. (1999). Taking time seriously, a theory of socioemotional selectivity. *American Psychologist, 54(3)*, 165-181.
- Carstensen, L. L., Pasupathi, M., Mayr, U., Nesselroade, J. R. (2000). Emotional experience in everyday life across the adult life span. *Journal of Personality and Social Psychology, 79(4)*, 644-655.
- Chapman, B. P., Duberstein, P. R., Sorenson, S., Lyness, J. M. (2007). Gender differences in five factor model personality traits in an elderly cohort. *Personality and Individual Differences, 43*, 1594-1603.
- Charles, S. T., Carstensen, L. L., McFall, R. M. (2001). Problem-solving in the nursing home environment: age and experience differences in emotional reactions and responses. *Journal of Clinical Geropsychology, 7(4)*, 319-330.
- Charles, S. T., Mather, M., Carstensen, L. L. (2003). Aging and emotional memory: the forgettable nature of negative images for older adults. *Journal of Experimental Psychology: General, 132(2)*, 310-324.
- Charles, S. T., Reynolds, C. A., Gatz, M. (2001). Age-related differences and change in positive and negative affect over 23 years. *Journal of Personality and Social Psychology, 80(1)*, 136-151.
- Happe, F.G.E., Winner, E., Brownell, H. (1998). The getting of wisdom: theory of mind in old age. *Developmental Psychology, 34(2)*, 358-362.
- Isaacowitz, D. M., Lockenhoff, C. E., Lane, R. D., Wright, R., Sechrest, L., Riedel, R., Costa, P. T. (2007). Age differences in recognition of emotion in lexical stimuli and facial expressions. *Psychology and Aging, 22(1)*, 147-159.
- Isaacowitz, D. M. & Smith, J. (2003). Positive and negative affect in very old age. *Journal of Gerontology, 58B(3)*, 143-152.
- James, L. E., Burke, D. M., Austin, A., Hulme, E. (1998). Production and perception of "verbosity" in younger and older adults. *Psychology and Aging, 13(3)*, 355-367.
- Kemper, S. (1987). Life-span changes in syntactic complexity. *Journal of Gerontology, 42*, 232-238.
- Kemper, S., Greiner, L. H., Marquis, J. G., Prenovost, K. Mitzner, T. L. (2001). Language decline across the life span: findings from the nun study. *Psychological Aging, 16(2)*, 227-239.

- Kemper, S., Herman, R., Liu, C. (2004). Sentence production by young and older adults in controlled contexts. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 59, 220-224.
- Kemper, S., Marquis, J., Thompson, M. (2001). Longitudinal change in language production: effects of aging and dementia on grammatical complexity and propositional content. *Psychological Aging*, 16(4), 600-614.
- Kemper, S., & Sumner, A. (2001). The structure of verbal abilities in younger and older adults. *Psychological Aging*, 16(2), 312-322.
- Kennedy, Q., Mather, M., Carstensen, L. L. (2004). The role of motivation in the age-related positivity effect in autobiographical memory. *Psychological Science*, 15(3), 208-214.
- Mather, M., & Carstensen, L. L. (2003). Aging and attentional biases for emotional faces. *Psychological Science*, 14(5), 409-415.
- Mather, M., Canli, T., English, T., Whitfield, S., Wais, P., Ochsner, K., Gabrieli, J., Carstensen, L. (2004). Amygdala responses to emotionally valenced stimuli in older and younger adults. *Psychological Science*, 15(4), 259-263.
- Mather, M. & Carstensen, L. L. (2005). Aging and motivated cognition: the positivity effect in attention and memory. *Trends in Cognitive Science*, 9(10), 496-502.
- Maylor, E. A., Moulson, J. M., Muncer, A., Taylor, L. A. (2002). Does performance on theory of mind tasks decline in old age? *British Journal of Psychology*, 93, 465-485.
- Mroczek, D. K. (2001). Age and emotion in adulthood. *Current Directions in Psychological Science*, 10(3), 87-89.
- Mroczek, D. K., & Kolarz, C. M. (1998). The effect of age on positive and negative affect: a developmental perspective on happiness. *Journal of Personality and Social Psychology*, 75(5), 1333-1349.
- Mroczek, D. K., & Spiro, Avron III. (2007). Personality change influences mortality in older men. *Psychological Science*, 18(5), 371-376.
- Pasupathi, M., Henry, R. M., Carstensen, L. L. (2002). Age and ethnicity differences in storytelling to young children: emotionality, relationality, and socialization. *Psychology and Aging*, 17(4), 610-621.
- Pennebaker, J. W., Graybeal, A. (2001). Patterns of natural language use: disclosure, personality, and social integration. *Current Directions in Psychological Science*, 10(3), 90-93.

- Pennebaker, J. W., Mayne, T. J., Francis, M. E. (1997). Linguistic predictors of adaptive bereavement. *Journal of Personality and Social Psychology, 72*(4), 863-871.
- Pennebaker, J. W., Stone, L. D. (2003). Words of wisdom: language use over the life span. *Journal of Personality and Social Psychology, 85*(2), 291-301.
- Rude, S. S., Gortner, Eva-Maria, Pennebaker, James W. (2004). Language use of depressed and depression-vulnerable college students. *Cognition and Emotion, 18*(8), 1121-1133.
- Sullivan, S. & Ruffman, T. (2004). Social understanding: how does it fare with advancing years? *British Journal of Psychology, 95*, 1-18.
- Taylor, S. E. & Gollwitzer, P. M. (1995). Effects of mindset on positive illusions. *Journal of Personality and Social Psychology, 69*(2), 213-226.
- Verhaeghan, P. (2003). Aging and vocabulary scores: a meta-analysis. *Psychology and Aging, 18*, 332-339.
- Walton, C., Coyle, A., Lyons, E. (2004). Death and football: an analysis of men's talk about emotions. *British Journal of Social Psychology, 43*, 401-416.
- Watson, T. L. & Blanchard-Fields, F. (1998). Thinking with your head and your heart: age differences in everyday problem-solving strategy preferences. *Aging, Neuropsychology, and Cognition, 5*(3), 225-240.

