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Supplement Article

Referential Ambiguity in the Narrative Productions of African American Adults

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Purpose: The purpose of this study was to examine the production of referential ambiguities in two contrasting narrative conditions among age-defined groups of healthy African American women.
Method: Twenty middle-aged adults (M = 51 years) and 20 older adults (M = 72 years) produced a complex story retelling and a personal narrative. All narratives were transcribed orthographically, parsed into T-units, and analyzed for surface structure markings of referents and the presence of ambiguities.
Results: The results demonstrated that older adults produced more ambiguities than middle-aged adults, were more compromised with task complexity, used more role or relation designations to refer to story characters while underusing proper names, and exhibited significant lexical retrieval deficits during ongoing narrative production. Middle-aged adults produced more proper names, but were also challenged by the complexity of the story-retelling task. Moreover, the results showed that older adults produced more African American English variants than middle-aged adults.
Conclusion: This investigation revealed a pattern of age-related ambiguities during narrative production. The results demonstrated that lexical retrieval from long-term semantic memory was an important predictor of ambiguity, whereas African American English contributed negligibly. These results show that referential ambiguities may be a robust characteristic of cognitive–linguistic changes that occur with typical aging.

A fundamental issue in speech-language pathology is how speakers select referential expressions to refer to entities in ongoing discourse. *Referencing* involves the process of referring to people, places, objects, events, and ideas in the world during social interactions (Arnold, 2010). In this regard, the goal is to convey information that will allow the interlocutor to accurately identify an entity and comprehend the topic of discourse. For example, to specify a particular dog, a speaker may use a variety of referential expressions such as *Rufus*, *my dog*, *the Doberman with the silver collar*, or simply *he*. Referencing is important to every aspect of human communication, whether verbal, visual, or manual, and takes into account both situational and world knowledge (Kibrik, 2011). Selecting appropriate referential relationships for words and their entities is fundamental to discourse clarity and comprehension (Nieuwland & Van Berkum, 2008). Therefore, referential communication is an extremely useful paradigm in which to explore all types of linguistic knowledge, including language competence and performance, as well as pragmatics in social interactions and cognitive–linguistic processes (Bunce, 1991; Kibrik, 2011). The speech-language pathologist is uniquely qualified to judge the adequacy of referential communication and to provide training to improve this ability.

The role of referencing in discourse production has not been systematically examined in aging African American adults. Information concerning the referential abilities of African Americans may be beneficial to speech-language pathologists along several potentially important dimensions. For example, such information can provide a guidepost to distinguish between typical referencing and those that may potentially represent impairment. In addition, it may enhance the interpretation of individual client performance as well as facilitate the development of cognitive–linguistic profiles and patterns in older African Americans, particularly those who use the African American English (AAE) dialect, as well as those who present with pathology. Thus, the normative patterns presented here may provide a foundation for a more reliable analysis and interpretation of that information in adults who do not use mainstream American English (MAE). As such, referring abilities provide a rich source of linguistic data for speech-language pathologists who are interested in the language competencies of adults at the discourse level.

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It is the speaker's responsibility to select appropriate referring expressions to use and when to use them as well as to ensure that each identity of a person, place, or event is easily recognizable as it is introduced and tracked throughout the discourse. Consequently, the speaker's goal is to make certain that the listener is able to pick out the referent from alternatives that might be mistaken for the target referent. When a speaker fails to clearly indicate an entity to which he is referring, an ambiguity may easily occur. An *ambiguity* ensues when a discourse referent is not clearly specified, when it can corefer to more than one entity, or when the referent is unclear from the discourse context (Nieuwland & Van Berkum, 2008). For example, in the following statement: *"Laura and Susan were planning dinner. Laura likes Chinese food, but Susan prefers Italian. She finally selected Italian for dinner."* The pronoun *she* is referentially ambiguous because two potential referents are introduced in the same discourse segment. In this case, *she* may refer to either Laura or Susan. The speaker may believe that the referring expression is adequate and may assume that the listener can select the unique referent from among multiple candidates, but if the listener cannot distinguish between referents, then a communication failure has occurred. This, then, is the essence of referential ambiguity. When two or more referents that are semantically compatible with the referring target have been introduced in the same discourse segment, there is the potential for referential failure (Arnold & Griffin, 2007; Brown-Schmidt & Tanenhaus, 2008). The speaker must, therefore, provide the necessary contrasting information, either metacognitively or based on listener cues, to disambiguate the statement (Arnold, 2010; Kibrik, 2011). This ability is an important speaker skill that is crucial for success in all forms of human communication. Referential ambiguity disrupts comprehension and the forward flow of everyday discourse (McCabe & Bliss, 2006; Nieuwland & Van Berkum, 2008). However, this disruption is temporary because the speaker recognizes the failure and attempts to disambiguate the referent (Brown-Schmidt & Tanenhaus, 2008; Nieuwland & Van Berkum, 2008). Temporarily ambiguous references are normal in everyday discourse whenever there is more than one potential candidate for a referent (Brown-Schmidt & Tanenhaus, 2008).

The question then becomes, how do speakers choose one referential form over another and, in doing so, how do speakers avoid potential ambiguity with each referential selection? To answer this question, we must begin with a delineation of the different types of referential forms. Referential expressions are represented linguistically by three levels of identification and are ordered hierarchically (Ariel, 1990, 1994; Arnold, 2010; Kibrik, 2011). Lexical identification (*Barack Obama*) is the strongest and most explicit level of identification. Pronominal reference (*he*) is the intermediate level of identification. Ellipsis, characterized by the absence of surface linguistic representation (*Ø get the cups and I'll pour the coffee*), is the weakest level of identification. Referential expressions in AAE use forms similar to those of MAE. AAE is a rule-governed linguistic system characterized by a common core of grammatical and lexical features (Dillard, 1972; Green, 2002). However, certain dialectal patterns and surface structure markings of reference in AAE are uniquely different from mainstream referential expressions (Mufwene, 1992). These include common nouns (*brother*), which may easily switch to proper nouns (*Reverend Jones)* and back again (*brother, man*; Rickford, 1999), the associative plural strategy for pronominal use (*Sonny and them*), reflexive pronouns (*They had theyself a good time*; Rickford, 1999), pronominal apposition (*Nathan, he went and bought me a ring*; Rickford, 1999), additions (*We laughed and we sang*; Dillard, 1972; Mufwene, 1992), subject deletion (i.e., ellipsis; *One evening, Ø come running;* Mufwene, 1998); consecutivization, in which one event is coupled with another by a repeat subject referent and may be ellipted *(He went and Ø gone and Ø told my teacher I was cheatin')* or expressed *(She ran down the street and she hollerin' and she screamin' like she crazy*; Welmers, 1973); and the use of ellipses in narrative clauses beginning with "say/said" *(Ø said, Ø got me workin' hard*; Mufwene, 1992).

Memory constraints play a critical role in the form the referent will take as well as in the production of potential ambiguities (Almor, 2000; Gundel, Hedberg, & Zacharski, 1993). Given the memory processes associated with reference management, an important issue is the possible factors that may cause referential ambiguities and subsequent referential communication failures. One factor is that keeping track of referents during ongoing discourse requires the screening out of interfering information and inappropriate referents, while keeping the current referent active in working memory (Arnold, 2010; Pratt, Boyes, Robins, & Manchester, 1989). The interfering referent may lead to the suppression of the entity or may become confused with the entity leading to ambiguity (Gernsbacher, 1990). Another factor is the distance between an initial reference to an entity and its subsequent anaphora. According to Givón (1983), after an entity has been introduced into the discourse in explicit lexical form, the speaker will then use a less explicit referential expression such as a pronominal anaphora to refer to the entity. As textual distance increases, the referent becomes susceptible to deterioration in the shared consciousness of both speaker and listener. In this case, the speaker must reinstate the referent using a more explicit (lexical) expression. Other factors include lexical retrieval failures due to decay of the semantic representation of the referent over time (Ariel, 1990), tip-of-the-tongue experiences where the speaker knows the explicit reference label but cannot retrieve it (Burke, MacKay, Worthley, & Wade, 1991), and faulty activation of the referent resulting in partial retrieval or complete retrieval failure (Gundel et al., 1993).

Aging and Referential Ambiguity

Older adults may experience difficulties with the cognitive demands of referencing. These deficits may be attributed to limitations in working memory and long-term semantic retrieval (Burke & Shafto, 2008; Ulatowska, Hayashi, Cannito, & Fleming, 1986). The extant literature

addressing the needs of the mainstream population speaks to a ubiquitous decline of these functions in old age. For example, in an experiment by Hendriks, Englert, Wubs, and Hoeks (2008) on referential selection using pictures as a basis for narrative production, results showed that older adults (M = 82 years) produced significantly more pronominal references and significantly fewer explicit lexical references than younger adults (M = 23 years), leading to ambiguity. Hendriks et al. (2008) noted that less explicit referential selections were due to limitations in working memory capacity, forcing older adults to frequently produce nonrecoverable or ambiguous pronouns. In a subsequent experiment by Hendriks, Koster, and Hoeks (2014), in which the production task was storytelling based on a picture storybook, younger adults (M = 26 years) produced more lexical references than pronominal references, making their narrative productions overly informative. In contrast, older adults (M = 79 years) produced more ambiguous pronominal expressions, particularly toward the end of their stories. A possible explanation was that older speakers resorted to the more economical pronoun when experiencing difficulty keeping track of the referent in the discourse. In another study, Ulatowska et al. (1986) sought to determine if a progressive deterioration in the use of reference was evident in three groups of aging women (i.e., middle-aged, M = 41 years; young-elderly, M = 70 years; and old-elderly, M = 85 years). Participants produced a simple narrative based on a three-panel cartoon, a retelling of a complex narrative (O. Henry story), and a narrative account of a memorable experience. The results indicated that referential disruptions began to emerge in the young-elderly and became significantly more prominent in the old-elderly. Ambiguities increased with task complexity and were characterized by the production of fewer proper names and fewer varieties of lexical types to refer to story characters. It was concluded that referential disruption was characteristic of general cognitive–linguistic decline as a function of advancing age. Hence, older adults may exhibit difficulty remembering information required for the specification of a referent and may have difficulty retrieving lexical representations of referents. Although no data currently exist on the African American speaker or the interaction of AAE on the cognitive processes important for referential communication, it is reasonable to assume that referential processing and production are vulnerable to cognitive aging, regardless of race or ethnicity.

African Americans represent a rapidly growing segment of the older adult population (Administration on Aging, 2010). As such, there is an emergent body of evidence suggesting that African American adults may be at risk for greater cognitive decline compared to their mainstream counterparts (e.g., Erving, 2011; Jackson et al., 2011; Lee et al., 2012). This has been attributed to a vulnerability to diabetes (Brancati, Kao, Folsom, Watson, & Szklo, 2000), hypertension (Din-Dzietham, Nembhard, Collins, & Davis, 2004), and cardiovascular disease (Knopman et al., 2001), in addition to exposure to high levels of stressors (Heard, Whitfield, Edwards, Bruce, & Beech, 2011). For this reason, typically aging African Americans present a unique opportunity to understand the influences of these health concerns on the cognitive–linguistic system.

The management of referencing can vary by culture, language, dialect, style, context, and educational attainment. How entities are introduced and tracked in discourse depends on the storyteller and the linguistic expressions with which he or she selects to accomplish this task. Stylistic differences in discourse, linguistic differences, and surface structure differences used in marking references within the narrative framework, along with a heightened vulnerability to health and cognitive impairments, make the study of the referential communication abilities of aging African Americans an important and compelling line of research. Considering the sensitivity of referential management to cognitive disturbances and the vulnerability of older African Americans to a presumably precipitous cognitive decline, the need for research-informed direction seems especially critical. Studies of this nature may be used to identify ethnic features in communicative style, which can be used as a normative gauge against which to distinguish language impairment.

Therefore, the aim of this investigation was to examine the production of ambiguities and the adequacy of reference management in tasks of story-retelling and spontaneously generated personal narratives. Specific questions included the following:

1. Is there a pattern of age-related referential disruption as manifested in increased ambiguities in the narrative productions of middle-aged and older African American adults?
2. Is there a relationship between a linear combination of memory variables and ambiguity?
3. Do AAE referential forms influence ambiguities?

Method

Participants

Forty community-dwelling (i.e., not nursing home residents) African American women from the Washington, DC, metropolitan area participated in the study. Participants were divided into two groups consisting of 20 middle-aged adults (ages 45–55 years) and 20 older adults (ages 65–86 years). Age classification was based on baby-boomer status and retirement age. In addition, generational differences were expected to emerge, given the 10-year age gap between groups (Thane, 1989). Women were chosen as the focus population for this investigation following a precedent set by Ulatowska et al. (1986). African American women were specifically selected because they are at a higher risk than men for developing age-related chronic disease and dementia (Erving, 2011; Lee et al., 2012; Rosser, 2000). Moreover, older African American women are more likely to report lower self-rated health and greater functional limitations, which are associated with a more precipitous cognitive decline, compared to their male and Caucasian counterparts (Garrett et al., 2013).

Participants were recruited through the Foster Grandparent Program of Washington, DC, social organizations, and referrals. All participants were native English speakers and, according to self-report, met the following inclusionary criteria: (a) no history of significant head trauma or psychiatric illness, (b) no alcohol or drug dependence, (c) no history of language disorder or learning disability, (d) a minimum of a high school diploma, and (e) typical cognitive functioning as indicated by performance on the Short Portable Mental Status Questionnaire (SPMSQ; Pfeiffer, 1975). Demographic information along with the results of the cognitive measurement analysis are summarized in Table 1. All data were collected with the approval of the Institutional Review Board of the University of Memphis.

Cognitive Measurements

All participants completed a battery of verbal memory tests hypothesized to influence referential ambiguity, including verbal working memory, episodic memory, immediate and delayed recall, and lexical retrieval from long-term semantic memory. These metrics were designed to determine whether the linear combination of memory measurements would significantly correlate with ambiguity, and to determine the relative contribution of different components of memory to referential failures. The Forward Digit Span (FDS) and Backward Digit Span (BDS) subtests from the Wechsler Adult Intelligence Scale–Revised (WAIS-R; Wechsler, 1981) were used as estimates of short-term and verbal working memory, respectively. Lexical retrieval from long-term semantic memory was assessed using the Controlled Oral Word Association–Category Fluency Test (CFT; Borkowski, Benton, & Spreen, 1967). In the present study, two measurements were obtained. One was the total number of items named within the fixed time of 1 min and the second was the number of items obtained when participants were allowed as much time as needed to complete the task. The two story subtests from the Arizona Battery for Communication Disorders of Dementia (ABCD; Bayles & Tomoeda, 1993) were selected to assess immediate and delayed recall. The Immediate Story Recall subtest was an assessment of short-term recall and the Delayed Story Recall was an assessment of episodic memory.

Table 1. Participant demographic and cognitive measurements.

	Middle-aged		Older		
Variables	***M***	***SD***	***M***	***SD***	***p***
Age[a]	50.50	2.93	71.75	7.43	
Education (in years)	15.15	2.37	13.45	1.96	.02
Income[b]	5.25	1.74	3.45	1.76	.00
Digit span test (total)	18.15	4.09	16.20	3.38	.11
FDS	10.55	2.04	9.30	2.03	.06
BDS	7.35	2.98	6.65	2.52	.43
Category Fluency Test					
Timed	18.80	4.37	13.25	3.81	.00
Untimed	21.55	6.15	14.70	5.33	.00
ABCD-Immediate Story Recall	14.75	2.15	13.80	1.96	.15
ABCD-Delayed Story Recall	14.50	2.35	13.55	2.50	.22
AAE Summary score[c]	2.00	0.04	7.00	0.10	.02

Note. FDS = Forward Digit Span subtest from the Wechsler Adult Intelligence Scale–Revised; BDS = Backward Digit Span subtest from the Wechsler Adult Intelligence Scale–Revised; ABCD = Arizona Battery for Communication Disorders of Dementia; AAE = African American English.

[a]Age in chronological years. [b]Scale is 1 = *under $10,000* to 7 = *$50,000 and over*. [c]High scores indicate high levels of AAE use.

African American English

AAE counts were derived by examining each narrative for AAE features unique to the dialect. Only those AAE variants that were present in the narratives were included in the analyses. A list of AAE variants along with the results of the Mann-Whitney *U* test indicating differences between age groups and narrative condition is found in Table 2. A single variable called AAE summary score, representing dialect density, was created by counting the total number of AAE variants produced in a narrative and dividing that value by the total number of words in the narrative (cf. Craig & Grogger, 2012). High AAE summary scores represented high levels of AAE use, whereas low scores represented a preference for MAE use.

Materials

Tasks designed to elicit referential expressions consisted of two narratives. The narrative form of discourse was chosen as the genre with which to explore referential ambiguities because it allows the speaker to use language in a natural and unrestrained way, while providing insights into the speaker's language competence and performance (McCabe & Bliss, 2006). Furthermore, narratives draw on the ethnic and sociocultural conventions that are implicit in effective communication (Heath, 1986). The first narrative entailed the reproduction of a complex story by O. Henry, "After Twenty Years" (1913), modified from the original version (cf. Cannito, Hayashi, & Ulatowska, 1988; North, Ulatowska, Macaluso-Haynes, & Bell, 1986). The inherent complexity of this task was designed to uncover subtle age-related cognitive–linguistic changes that occur with typical aging. The second narrative was a spontaneously generated account of a personal experience. This task provided a more realistic indication of referential use in everyday discourse.

Procedure

Each participant was tested individually in a quiet room with a Marantz Portable Recorder, Model No. PMD430 (Marantz, Cumberland, RI) optimally positioned. Narratives were recorded through an Audio-Technica, Model ATR35s, low-impedance lavalier microphone (Audio-Technica, Stow, OH) input into the Marantz recorder for clarity of audio reproduction. After informed consent was obtained and screening and cognitive measurements were administered, all participants completed the two narrative tasks. The O. Henry story was prerecorded at a

Table 2. African American English variants.

AAE variants	Middle-aged adults	Older adults	*U*	*p*	Example
Appositives					*You know, Nathan, he went and bought me a ring.*
Story retelling	19.50	21.50	180.00	.44	
Personal narrative	16.05	24.95	111.00	.01	
Subject deletion					*One evening, Ø come running, say, let's go down in the woods.*
Story retelling	19.73	21.28	184.50	.59	
Personal narrative	18.33	22.68	156.50	.11	
Past tense forms					*I finish my work.*
Story retelling	18.60	22.40	162.00	.17	
Personal narrative	15.90	25.10	108.00	.00	
Copula deletion					*He a policeman.*
Story retelling	18.50	22.50	160.00	.04	*You right.*
Personal narrative	19.00	22.00	170.00	.08	
Irregular verb uses					*I had went there Monday.*
Story retelling	23.75	17.25	135.00	.02	*I seen him before.*
Personal narrative	19.23	21.78	174.50	.34	
Multiple negation					*Couldn't nobody do it.*
Story retelling	20.50	20.50	200.00	1.00	*Nobody didn't do it.*
Personal narrative	18.00	23.00	150.00	.02	
Consecutivization					*We was eatin, Ø drinkin, Ø dancing, Ø havin' a good ole time.*
Story retelling	20.00	21.00	190.00	.32	
Personal narrative	18.50	22.50	160.00	.04	

relatively slow speaking rate and with typical prosody using Kay Elemetrics CSL Speech Software, Model 4300B (KayPENTAX, Montvale, NJ). Participants were provided with the written text and were invited to read along silently with the audio presentation. Immediately following the audio and written presentation, the written text was removed. Participants were instructed to retell the story as thoroughly and as accurately as possible, as if to someone who was unacquainted with the story and story characters. In the second narrative task, participants were asked to provide an account of a memorable experience. They were allowed sufficient time to think of a story and to mentally organize it. When the participant was ready, she was prompted to begin the narrative. The mean latency period between organizing the story and the onset of narrative production was 31.70 s (range = 10.39–42.61 s). Neutral prompts were used to expand the narrative, such as, "*And then what happened?*" or "*Anything else*?"

Analysis Procedures

After the narrative samples were collected, they were prepared for examination following the procedures of discourse analysis derived from prior works of Cannito et al. (1988) and Ulatowska et al. (1986). All narratives were transcribed orthographically, cleansed by eliminating mazes (i.e., false starts, abandoned utterances, repetitions, and fillers) and then parsed into terminal units (T-units) using the principles outlined by Hunt (1964). The *T-unit* is a main clause, all subordinate clauses and other constructions that go with it (Hunt, 1964). The T-unit was used as a framework for referential analysis because it is comparable to a discourse sentence and may conceptually represent the stream of language production (Geisler, 2004).

The transcripts were then analyzed for surface structure markings of referents. The references that were considered included nouns (*Bob, policeman, man*), third-person pronouns (*he, she*) and ellipses in subject position (*Ø came running*). Each reference to a story character was then analyzed for referential ambiguity following methods adapted from Halliday and Hasan (1976). This included frequency counts of unclear referencing, such as the use of a pronoun without a clear antecedent or cases in which a character's identity was not recoverable from the discourse context. The analysis of referential ambiguity was, therefore, the proportion of ambiguities in nouns, pronouns, and ellipses. To control for differences in story length, frequency counts were converted into derived scores by dividing the total number of each reference type by the total number of T-units for each narrative condition and then multiplied by the grand mean for T-units across subjects. These transformations were entered into all statistical analyses. In this way, meaningful task comparisons were made such that each participant's performance was examined against the same story length (i.e., an average of 40 T-units).

To further characterize the nature of the observed ambiguities, an examination of the semantic depth of referential specificity was conducted. This was a semantic feature analysis in which each lexical referent was assigned to one of four levels of semantic depth using the taxonomic hierarchies for nouns provided by Ulatowska et al. (1986). Level 1 was the most general designation (*individual*), Level 2 included common nouns (*man*), Level 3 expressed role and relation designations (*friend*), and Level 4 was the most specific and unique designation (*Bob*). This analysis represented the combined data for both narrative conditions.

Reliability

Transcriptions and coding of the narratives from the audio recordings were completed by the first author. To test interrater and intrarater reliability, a random selection of 20% of the narratives, which included four story retellings

and four personal narratives from each group, were retranscribed and recoded by the first author. Three graduate students in speech-language pathology, trained in the analysis procedures but blind to the hypotheses and group assignments, transcribed and coded the same selection of narratives. Analyses of transcriptions included word-by-word agreements and disagreements, T-unit segmentation, analysis of referential ambiguity, and frequency of AAE variants.

Referential ambiguity was examined by judging each noun, third-person pronoun, and ellipsis in the narrative for a clear antecedent based on a binary scale (0 = *referent is clearly specified and readily recoverable from the text*; 1 = *referent cannot be easily recovered from the text*). Ambiguities were resolved based on linguistic, contextual, and pragmatic grounds. To assist in this determination, a set of criteria was applied to determine whether referring expressions had an adequately established referent. These criteria answered the following questions: (a) Can the entity indicated by each referring expression be identified? and (b) Is the entity identified with appropriate specificity in the context? Point-to-point agreement was calculated for each analysis by dividing the total number of agreements by the total number of agreements plus disagreements. Disagreements occurred in subjective judgments and the erroneous inclusion of generic (e.g., *The one I knew from childhood*) or nonreferring expressions (e.g., *There appeared a man wearing a raincoat)*, both of which do not refer to a specific antecedent and should have been omitted from the analysis. Intratranscriber reliability for both retranscription and recoding was 98%. Intertranscriber agreement for transcription was 93%. Reliability for T-unit segmentation was 95%, AAE frequency was 92%, and referential ambiguity was 92%.

Reliability of the semantic depth analysis was determined by having a graduate student in speech language pathology and the first author independently reanalyze the data. The student was given a random selection of four story retellings and four personal narratives from each group. After the analysis was completed, the student and the first author met to review the results. Areas of disagreement included erroneous assignments of a lexical referent to the wrong level. The results showed that intrarater reliability was 99% and interrater reliability was 97%. Levels of reliability observed for all variables were deemed sufficient to permit further inferential statistical analyses.

Results

Frequency of Ambiguities

The first research question addressing the issue of whether a pattern of age-related referential disruptions exist in the narratives of middle-aged and older adults was answered using a 2 × 2 mixed model repeated measures analysis of covariance (ANCOVA). Age group, the between-subjects factor, had two levels (middle-aged, older adults); narrative condition, the within-subjects factor, had two levels (story-retelling, personal narrative). Educational attainment in years and the AAE summary score were incorporated as covariates. Follow-up pairwise comparisons were made using Bonferroni's correction. Post hoc procedures were calculated using the adjusted means, which reflected the effects of the variation represented by education in years and the AAE summary score on the dependent variable. An a priori alpha level of .05 was set for this and all statistical tests. Observed means, standard deviations, and adjusted means for the frequency of referential ambiguities are presented in Table 3.

The ANCOVA analysis yielded a main effect of age such that, overall, older adults produced significantly more ambiguities than middle-aged adults, $F(1, 36) = 4.42$, $p = .04$, $\eta_p^2 = .11$. The analysis also found a main effect of narrative condition, in which story-retelling elicited significantly more ambiguities than personal narratives, $F(1, 36) = 9.74$, $p = .00$, $\eta_p^2 = .21$. Within-subjects contrasts revealed that ambiguities increased linearly over the course of story retelling ($p = .00$). No other contrasts were significant. The interaction of age group and narrative condition was not significant ($p > .12$). Higher way expansion of the ANCOVA design also demonstrated no influence of AAE usage or educational attainment on interactions among the between-group and within-group variables ($p > .10$).

Semantic Depth of Referencing

An analysis of semantic levels was conducted in which lexical references were classified according to four levels of depth. The Mann-Whitney *U* test was employed given the ordinal nature of the data. Table 3 displays the observed means, standard deviations and *U* test results for each level of semantic depth. The *U* test indicated that only Level 3 (role/relations), $U = 119.0$, $p = .03$; and Level 4 (proper names), $U = 94.0$, $p = .00$, were significantly different between groups. Middle-aged adults produced significantly more Level 4 designations (e.g., *Sheila, Bob*), whereas older adults produced significantly more Level 3 designations (e.g., *friend, mother*).

Ambiguity and Memory

The second research question sought to determine the relationship between the production of ambiguities and memory. Independent-samples *t* tests were conducted to determine if the age groups differed on the cognitive measurements. Table 1 displays the results of the analysis, which indicated that age groups performed comparably on both digit span subtests and the ABCD story recall subtests. Significant age-related differences were observed in the number of categorical items generated in the CFT. Moreover, significant age-related differences persisted even when no time limit was imposed. However, it is possible that the restrictive inclusion criteria limiting the age range of the two groups may have prevented the identification of differences in the cognitive measurements. Age-related differences may have emerged if a wider age range of participants had been used.

Table 3. Observed means, standard deviations, and adjusted means for proportion of ambiguities and levels of semantic depth analysis.

	Middle-aged adults			Older adults		
	Observed		Adjusted	Observed		Adjusted
Variables	*M*	*SD*	*M*	*M*	*SD*	*M*
Proportion of ambiguities						
Story retelling	4.69	5.65	5.29	11.28	9.33	10.68
Personal narrative	0.35	0.85	0.28	0.90	1.74	0.97
Levels of semantic depth						

	Middle-aged adults		Older adults			
Variables	*M*	*SD*	*M*	*SD*	*U*	*P*
Level 1	4.07	3.67	4.47	5.02	187.00	.74
Level 2	8.28	4.77	7.55	4.41	185.50	.70
Level 3	18.18	6.66	24.29	9.98	119.00	.03
Level 4	11.88	7.15	5.96	6.78	94.00	.00

It was important to determine if the linear combination of memory measurements predicted the production of ambiguities. To answer this question, a multiple linear regression was performed using the cognitive measurements as predictor variables, including the FDS, BDS, CFT, and ABCD–Delayed Story Recall. The ABCD–Immediate Story Recall was eliminated from the regression model due to high multicollinearity with the Delayed Story Recall, while contributing negligible unique variance in the subsequent analysis. The variable representing ambiguities, pooled across narratives, was entered into the regression model as the criterion variable. Of the four predictor variables, only the CFT was significantly associated with ambiguity ($r = -.33$, $p = .02$), indicating that poor semantic retrieval was associated with a greater number of ambiguities. When the four predictor variables were entered into the model, their combined contribution accounted for only 13% of the total variance. Further, the ANOVA, testing the significance of the combined predictor variables, was not significant, $F(4, 35) = 1.31$, $p = .28$. Thus, only lexical retrieval from long-term semantic memory influenced ambiguity.

AAE and Ambiguity

The third research question addressed the issue of whether AAE influenced ambiguities. The previous ANCOVA did not demonstrate a significant influence of AAE on the frequency and form of referring expressions. Mann-Whitney *U* tests were used to determine differences between groups using the frequency of AAE for each narrative condition. The results showed a significant difference between middle-aged and older adults in the use of AAE for story-retelling ($U = 119.0$, $p < .02$) and for personal narratives ($U = 73.5$, $p < .00$), in which older adults produced more AAE variants than middle-aged adults. A probe into age-related differences in specific types of variants was conducted using the Mann-Whitney *U* test. The results are presented in Table 2. Results indicated that older adults produced significantly more appositives and consecutivizations than middle-aged adults. Other variants, such as reflexive pronouns *(they hid theyself),* and the associative plural for pronoun use (*Bobby and them*) were mostly produced by older participants and in their personal narratives.

Discussion

The aim of this study was to examine referential ambiguities in the narrative productions of middle-aged and older groups of healthy African American adults. The results demonstrated that older adults produced more ambiguities than middle-aged adults, were more compromised with task complexity, produced more role/relation designations to refer to story characters while producing fewer proper names, and exhibited significant lexical retrieval deficits. Middle-aged adults, on the other hand, produced more proper names, but were somewhat challenged by the complexity of the story-retelling task. The results also demonstrated that lexical retrieval from long-term semantic memory was an important predictor of ambiguity. Although AAE contributed negligibly to ambiguities, the results showed that older adults produced more AAE variants than middle-aged adults, primarily in the form of appositives and consecutivizations.

Effect of Age on Ambiguity

The first research question addressed the issue of whether a pattern of age-related referential disruption exists in the narrative productions of middle-aged and older African American adults. The results demonstrated that older adults produced significantly more ambiguities than middle-aged adults, irrespective of narrative condition. Moreover, examination of the data showed a reduction in the variety of lexical types along with an increase in pronominalizations among older adults, which together contributed to ambiguities. Both age groups produced significantly more ambiguities in story retelling than personal narratives, suggesting that middle-aged and older adults were equally vulnerable to the presence of complexity. This finding may have been mediated by story length and the number of references

contained in the original stimulus in the story-retelling task. Participants had to distinguish between four same-gender characters, extensive dialogue, and a character with a dual identity, which required inferences to interpret. Hence, the production of increased ambiguities elicited by the story-retelling condition may have been an artifact of the original stimulus or an indication that the dense information contained in the story may have overloaded participants' memory resources.

Another explanation involves the speaker's ability to presume the mental states of the listener. This taps into *theory of mind* (ToM), defined as the ability to understand the listeners' beliefs, perceptions, intentions, and emotions during social interactions (Bernstein, Thornton, & Sommerville, 2011). ToM assumes that shared knowledge between speaker and listener influences the communicative interaction such that the speaker will modify his discourse in accordance with the listener's perspectives and needs (Rakoczy, Harder-Kasten, & Sturm, 2012). Herein, story retellings were produced in the presence of a knowledgeable listener (i.e., examiner). Consequently, participants may have used less explicit referential forms to refer to story characters. Presumably, shared knowledge would make it unnecessary to use more explicit references. Had a naïve listener been present during the story-retelling elicitations (i.e., one lacking mutual knowledge with the speaker), participants may have adjusted their narrations to inform the listener with greater specificity. Moreover, there is evidence that ToM declines with increasing age (e.g., Bernstein et al., 2011; Rakoczy et al., 2012). Since the story-retelling condition was meant to be more challenging, it may have placed greater demands on ToM capabilities, potentially biasing toward production of increased ambiguities among older speakers. In the personal narrative condition, the examiner would not have shared knowledge, because the examiner was not well acquainted with the participant and the participant's biography. In this case, the examiner was a naïve listener because she was unfamiliar with the content of the personal narrative. This condition, however, also yielded increased ambiguity on the part of the older speaker.

The story-retelling condition prompted certain age-related differences in production. For example, the story retellings of older adults were often shorter and less detailed, and the referential anaphoras were within short distances from their antecedents, generally intrasentential or in the previous T-unit. This may have been a strategy to circumvent any anticipated memory failures (Burke et al., 1991), or speakers' presupposing the experimenter's prior knowledge of the story (Burke & Shafto, 2008). Another explanation is that the extended length of the story-retelling condition made it difficult for older adults to keep track of story characters and to remember how entities were introduced. This was made apparent by the comments of older adults regarding their concerns of remembering story details and story characters. For example, some older participants stated before beginning their reproductions, "*That's a long story, I don't know if I can remember it all,*" or midway during their retellings in which they skipped to the end of the story, stating "*I think that's about it, I can't remember any more.*" In contrast, the story retellings of middle-aged adults were longer and more informative. Middle-aged adults devoted more time to establish and talk about story characters and used more proper names as designations for entities. These results are consistent with previous research demonstrating similar performance patterns of mainstream older and younger adults during their complex narrative reproductions (e.g., Hendriks et al., 2014; North et al., 1986; Ulatowska et al., 1986). The online supplemental materials (Example 1) contain examples of participants' story-retelling.

Older adults also differed from middle-aged adults with respect to personal narrative production, even though personal narratives were generally less complex than story retellings and produced with significantly fewer ambiguities by both groups. The personal narrative was presumed to be easier to produce and more practiced than story-retelling. This was demonstrated by the observation that older adults produced longer personal narratives than middle-aged adults and more explicit referring expressions than in story retelling. When ambiguities occurred in personal narratives, they were generally in the presence of two same-gender characters and subsequent anaphoras could apply to them both. Ambiguities also occurred when less specific lexical designations (e.g., *my friend*) were introduced into the same segment with an established character or the speaker failed to signal that the new character and the established character were different entities. Examples of these productions are found in the online supplemental materials (Example 2).

Efficient referential communication involves making appropriate decisions regarding the choice of particular forms to refer to entities. The options available to introduce and track references are pragmatically specific and follow a systematic pattern. For example, African American speakers in the study generally introduced story characters with a proper name (*Bob*) or a general lexical expression (*the guy*). The next referral to the same entity was in pronominal form. It was not until distance elapsed or an intervening character was introduced into the narrative that the speaker returned to a lexical representation. This strategy reflects a global effect of referential management consistent with typical speakers (e.g., Almor, 2000; Arnold & Griffin, 2007; Gernsbacher, 1990; Givón, 1983). However, older adults produced more referential designations with less specificity (i.e., general nouns, pronouns, ellipses). This difference in referential form was accompanied by increased ambiguities. For example, after an explicit lexical introduction of a character (e.g., *Bob, Jimmy, police officer*), the older speaker rarely referred to the entity again with the same level of specificity. If the older speaker returned to a lexical expression, a less explicit form was used (e.g., *the guy, individual, gentleman*), thus contributing to the increased use of generic role/relation designations and the failure to distinguish referents from semantically similar entities (see the online supplemental materials, Example 3). In the analysis of these cases, it was often unclear as to which antecedent the referring expression should be attached. Because many of these role/relation designations also served

as antecedents, there was a carry-over effect for ambiguous pronominal anaphoras occurring soon after these expressions (see the online supplemental materials, Example 4).

There were instances in both groups in which a speaker introduced a character with a pronoun in subject position and followed that introduction with a lexical anaphor. Age-related differences were observed, in that middle-aged adults followed their pronominal introduction (*Then he appeared smoking a cigarette*) with an explicit lexical expression (*Bob, I think was his name*) whereas older adults followed their pronominal introductions (*He was inspecting the shops as he went by*), with a less explicit or general nominal expression (*the man*) or a descriptive designation (*the man smoking a cigarette*). It is unclear whether this is an effect of aging, problems during lexical retrieval, variations in discourse style, or characteristic of older African American discourse. African Americans have been described as employing a high-context discourse style, which is characterized by an indirect and implicit style of language, where meaning is derived from the immediate context and discourse is more responsive to an improvisational style of expression (Green, 2002; Gudykunst, 1998). Informal style influences the production of references with less specificity. Further, older adults' stories primarily centered on family members (e.g., *grandmother, mother*). When recounting a story about a close family member, the tendency was for speakers to use role or relation designations rather than the character's proper name. In these cases, the speaker used the same lexical designation to refer to the referent throughout the narrative. When proper names were used, they referred to characters who were not immediate family members (e.g., teachers, friends). In contrast, middle-aged adults told more stories about friends and acquaintances, generally preferring proper names. Some of these references combined role or relation designations and proper names in the form of lexical appositions (e.g., *my girlfriend, Earlene*).

Effect of Memory on Ambiguity

The second research question addressed the issue of whether the linear combination of memory measures was significantly related to ambiguity. Participants in the study did not exhibit overt signs of memory impairment. This finding may be due to the limited age range of participants or the fact that the memory measurements employed in the study were not sensitive enough to detect subtle differences between middle-aged and older adults. It was expected that working memory would predict ambiguity, but the results did not support that expectation. Instead, the results showed that the production of ambiguities was mediated by deficiencies in general lexical retrieval from long-term semantic memory. Narrative production requires rapid moving about in long-term semantic memory from entity to entity and concept to concept, and rapid moving about from concepts to the words conveying those concepts (see Chafe, 1976). Therefore, lexical retrieval difficulties were evident among older adults who produced significantly fewer categorical items and fewer explicit designations than their middle-aged counterparts. For some older adults, when a character was introduced by a proper name (*I'm waiting here for Jimmy*), subsequent mentions were in pronominal form and the proper name (*Jimmy*) never appeared again in the retelling. Older adults were able to recall the names of story characters sufficiently to introduce them, but did not maintain specific names as the narrative progressed, forcing them to default to weaker substitutions (e.g., pronoun, standardized or general label) or to omit the action completely. In contrast, middle-aged adults were more proficient in accurately representing references of the original stimulus in their retellings. They were able to introduce story characters by their specific names and were equally able to reintroduce the characters using the same names as they reemerged in the story. However, it is uncertain as to whether this difference in production between groups is characteristic of a continuum of typical cognitive aging. Should the present sample be compared with a younger population (e.g., aged 25–35 years), an age-related difference may be more pronounced.

AAE and Ambiguity

The third research question addressed the issue of whether AAE influenced ambiguities. The analysis indicated that older adults produced more AAE variants than middle-aged adults and, in general, produced more AAE variants in personal narratives than in story-retelling. Appositives (*Michael, he took me to the Howard Theater*) and consecutivizations in the form of repeat pronoun reference (*When he looked at him in the light, he saw that he wasn't him, Ø said you not him.*) and ellipses (*He went, Ø done it anyway, Ø didn't even care*) were used more frequently than other AAE variants. However, these productions were not judged ambiguous because of the presence of the antecedent in the immediate textual environment. A small percentage of ellipsis production was judged to be ambiguous where same-gender characters were present in the same episode. For example: "*Bob and Jimmy were talking, Ø said it's been a long time, Ø didn't think you would show*." Here, ellipses could not be disambiguated based on the information provided. Ellipses usage almost exclusively followed AAE patterns. As in the previous examples, older adults used ellipses in "say/said" clauses. For those who used AAE, variants almost always referred to the same referent, were generally used within short distances (i.e., zero to one T-unit distances) and were contained within long referential chains.

Clinical Implications

The results of this investigation are promising, given that they revealed a pattern of age-related disruption in the management of reference during ongoing narrative production. Both older and middle-aged adults were challenged by complexity, but produced personal narratives that were less complex and with fewer ambiguities. Consequently, the dual paradigm of a formal story-retelling task and an informal personal narrative should be considered during the cognitive-linguistic assessment of African Americans, in

that they provide contrasting information on referential communication abilities.

AAE did not significantly influence ambiguity. AAE referential variants were always produced with their antecedents and anaphoras in the immediate environment, making them easier to track. It is important to note that not every participant in the study used AAE. Only a small subset of the participants (32%) used AAE referential variants in their productions. Middle-aged adults, most of whom were federal employees in Washington, DC, and self-reported a middle-class status, rarely used AAE. The use of AAE by participants in the study conforms to prior research in which age, gender, education, occupation, socioeconomic status, and sociocultural contexts influence the likelihood of those productions (e.g., Craig & Grogger, 2012; Dillard, 1972; Green, 2002; Rickford, 1999). Therefore, in any clinical encounter with African Americans, the speech-language pathologist must not assume AAE usage. However, if in the discourse component of the clinical evaluation, AAE variants are observed, the use of referential appositions and consecutivizations should not be regarded as unusual. The presence of dialect must be established through comprehensive assessment. With the normative information provided here, clinicians may be able to form some expectations about the client's use of referential forms as performance changes over time.

The results of this investigation demonstrated that aging African American adults exhibited referential patterns and ambiguous references similar to the productions of the mainstream population. However, only the current theories based on the mainstream population could be used as a framework for evaluating the performance of older African Americans. Therefore, based on the results, older African Americans were equally vulnerable to the effects of cognitive aging as their mainstream counterparts upon which the cited studies were based. It is unclear as to whether African Americans' vulnerability to age-related chronic disease and environmental stress contributed to these outcomes. It was assumed at the outset that the typical cognitive aging process in older African Americans would be similar to the mainstream population. However, to make direct assumptions of parallelism in referential abilities of African Americans and the mainstream population can only be ascertained through additional research.

Conclusions and Limitations

This study is unique in that it provides preliminary baseline data on the referential abilities of healthy aging African American adults. Although interests in the cognitive-linguistic concerns of this population have increased, there remains a lack of research on conceptual models describing typical cognitive–linguistic aging and, more specifically, the mechanism of referential communication among African American adults. Because ambiguities have been a consistent finding in investigations of discourse in older adults, the current study adds to that body of research, suggesting that referential ambiguities may be a robust characteristic of cognitive–linguistic changes that occur with typical aging regardless of race or ethnicity.

There are two potential limitations of the present study. The first is that a naïve listener condition was not utilized in story retellings. It is uncertain whether shared-knowledge versus unshared-knowledge elicitations will produce differences in reference form and narrative content. Therefore, future research should focus on effects of listener knowledge conditions as it pertains to ToM. The second limitation is that the results provided little indication of the referential abilities of African American men and those who are not well educated or physically healthy. Moreover, the restricted age ranges may have artificially curtailed the relationship observed between the memory variables and the measure of ambiguity. A broader spectrum of participants will better provide an indication of the referential communication characteristics of this population. Despite the limitations of subject selection, the results have yielded useful information on age-related changes and can be used as a springboard for further investigations.

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