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Talking across time: Using reported speech as a communicative resource in amnesia

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Abstract

Background—Patients with amnesia may have more than pure memory deficits, as evidenced by reports of subtle linguistic impairments on formal laboratory tasks in the amnesic patient HM. However, little attention has been given to the impact of memory impairments on language use in regular, colloquial interactions. We analysed *reported speech* use by individuals with amnesia. Reported speech (RS), in which speakers represent thoughts/words from another time and/or place, requires management of two temporal frames, making it an interesting discourse practice in which to explore the impact of memory deficits on interactional aspects of communication.

Aims—This study: (1) documents frequency, type, and temporal contexts of reported speech used in discourse samples; (2) compares reported speech use by amnesic and comparison participants; (3) examines the interactional character of reported speech use in these discourse samples.

Methods and Procedures—Derived from a broader study of the discourse practices of individuals with amnesia, this study uses quantitative group comparisons and close discourse analysis to analyse reported speech episodes (RSEs) in interactional discourse samples between a clinician and each of 18 participants, 9 individuals with amnesia and 9 comparison participants (NC).

Outcomes and Results—Reported speech was used by all participants. However, significantly fewer RSEs were produced in amnesia sessions (273) than in NC sessions (554). No significant group differences were observed for type or temporal domain. In addition, for the participants with amnesia, post-amnesia past RSEs differed qualitatively from the other RSEs in the data.

Conclusions—These findings have important implications for understanding the interdependent relationship of memory and language, point to the value of examining interactional aspects of communication in the empirical study of brain–behaviour relationships, and reconceptualise interaction as a target in the remediation of functional communication following brain injury.

The neuropsychological and neuroanatomical description of the seminal case of HM, throughout the 50 years of ongoing study of this patient (see Corkin, 2002; Scoville & Milner, 1957), provided significant insight into the organisation of human memory and its instantiation in the brain. We have learned from HM, and from other cases of amnesia (see Cohen &

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Eichenbaum, 1993; Squire, 1987), that damage to the hippocampus and related medial temporal lobe regions, whether by surgical resection, as in HM, or following anoxia or other neurological insult, results in a profound but circumscribed amnesia. The specificity of the impairment is critical. The observed impairment has been described as being specific *to* the domain of memory, as well as specific *within* the domain of memory. Thus, impairments are seen in aspects of memory function, disproportionate to any deficits in general cognitive or intellectual ability including language, attention, and reasoning. Moreover, the impairment affects only certain aspects, or forms of memory. The striking dissociation between spared and impaired memory abilities observed in HM and in other cases of amnesia (e.g., Cohen & Squire, 1980; Tranel, Damasio, & Damasio, 2000) documented that memory is not a unitary function, but rather is manifested in multiple functionally distinct memory systems supported by anatomically distinct brain systems. Evidence has accumulated that the crux of anterograde declarative amnesia due to hippocampal damage is a deficit in the ability to form and retain new long-term declarative memories (Cohen, 1984; Cohen & Eichenbaum, 1993; Eichenbaum & Cohen, 2001; Squire, 1992), including acquiring new vocabulary and facts (semantic memory) and memory for time- and place-specific experiences that are personal or autobiographical in nature (episodic memory).

One consequence of the observed specificity of amnesia has been to encourage a view of memory as a cognitive capacity distinct from the various cognitive domains (language, spatial processing, etc.) that it serves, and to see the impairment in amnesia as exclusive to a specific aspect of memory functioning. However, some recent work looking at the possible effects of amnesia on other aspects of cognition raises questions about the scope of amnesia as well as about the role(s) of memory in various domains of cognitive functioning. Among the cognitive capacities traditionally considered preserved in amnesia, language is a topic of debate. MacKay and colleagues (e.g., MacKay, Burke, & Stewart, 1998) suggest a critical role for the hippocampal system in certain language functions. Recent studies point to subtle lexical, phrasal, and sentence-level language impairments in HM that were previously unnoticed or de-emphasised. These language impairments appear to be quite subtle, though, particularly when compared to HM's profound memory impairments or compared to the deleterious deficits in linguistic form observed in aphasia or in pragmatic functioning in right hemisphere syndrome.

Thus far, investigations of the impact of amnesia, or the role of the hippocampus, in language function have been directed at formal aspects of language rather than to real-world aspects of language-in-use. This may underestimate the significance of any possible language problems, as a number of authors have commented on the impact of memory impairments on the ability to function in and manage everyday activities (Tate, 2002; Wilson, 1999) and the effects of amnesia on functional communication (see Ogden & Corkin, 1991; Wilson & Wearing, 1995), even if those effects are not as severe as those seen in aphasia. In our own work with individuals with amnesia, we have been struck by subtle disturbances in their conversational patterns (e.g., disruptions in timing of speaker turns, lack of engagement and support for their conversational partners, lack of detail or vagueness in their discourse), leading us to suspect that interactional aspects of language-in-use-may be more disrupted than the more formal testing might suggest.

THE CURRENT STUDY

To begin to explore the impact of memory impairments on language-in-use, as part of a broad examination of the discourse practices of individuals with amnesia (Duff, Hengst, Nolan, Tranel, & Cohen, 2005), we collected interactional discourse samples from individuals with amnesia as well as from a group of healthy comparison participants. Presented here is an initial analysis from the data set, focusing on the use of reported speech in these interactions.

Reported speech (RS) is a pervasive discourse practice in which speakers represent, or re-enact, words or thoughts from other times and/or/places (see Hengst, Frame, Neuman-Stritzl, & Gannaway, 2005; McCarthy, 1998; Tannen, 1989). Traditionally, RS has been classified into two canonical forms: direct reports, or quotes, of speech (e.g., *John said, "I'll be there at six"*), and indirect reports, or paraphrases (e.g., *John said that he would be here by six*). In addition to these canonical forms, researchers have identified a variety of ways in which speakers routinely represent the words of others, such as using blended direct and indirect forms (e.g., Volosinov, 1986), non-explicit descriptions of talk (e.g.,Hickman, 1993), and simply pointing to talk using indexical markers (e.g., Hengst et al., 2005).

Of particular interest to us here is the way that reported speech, across all of its forms, weaves together two temporal contexts within one utterance. The *reporting context* is the current time frame in which the speaker produces the report, while the *reported context* refers to the temporal frame in which the reported words were originally spoken. Discursively, speakers may specify the reported context quite precisely (e.g., *When I walked through the door on my first day of kindergarten the teacher said, "hi John"*) or vaguely (e.g., *During one of our family trips my sister asked me if she could borrow my jacket*), or leave it unspecified, as when reporting habitual comments (e.g., *Every time they think of it the kids ask, "now can we have a puppy?"*). In all cases, there is a requirement for maintaining, relating, and moving (mentally) between two separate time frames, which would seem to implicate memory along with language capabilities.

Within traditional structural linguistic perspectives reported speech has been construed as a relatively rare and specialised form functioning simply as a factual representation of past events. Although reported speech forms certainly could support veridical representation of the past, extensive empirical sociolinguistic research on the use of reported speech in everyday interactions has found it to be a common and diverse discourse practice serving a wide range of creative and interpretive functions. Speakers use reported speech forms to represent others' thoughts (including animals and inanimate objects), what might have been said (but wasn't), and what will (should or might) be said in the future, as well as to animate the voices of make-believe or fictional characters. In addition, speakers strategically construct, or reconstruct, others' thoughts and words (factual or hypothetical) to serve their own purposes (Clark & Gerrig, 1990; Tannen, 1989). In fact Tannen (1989) has argued in favour of the term *constructed dialogue*, over reported speech, on the basis that speakers seldom simply represent others' words verbatim, and even when they do, the represented words are re-constructed for new purposes in the reporting context, as speakers select what details to represent, what tones to put with words, and what impression to leave with the listener. Regardless of which term we use, this view of reported speech emphasises the cognitive and interactional flexibility and generativity that is required for its effective use.

The current examination of reported speech is, to our knowledge, the first study of reported speech use in amnesia. Reported speech represents an especially interesting discourse practice for studying the impact of memory impairments on interactional aspects of communication in the discourse of individuals with amnesia, particularly given the memory demands that would seem to be a requisite part of its successful use. Different perspectives lead to a range of different predictions of possible outcomes. Based on a classical view of amnesia as a deficit exclusively of memory (i.e., sparing language and other cognitive abilities), we might anticipate that individuals with amnesia would accurately produce a full range of reported speech forms (e.g., direct, indirect). However, to the extent that reported speech depends heavily on memory for previous events, and given the hallmark deficits in the ability to form and recall long-term declarative memories of places, people, and the temporal and interactional relations among them (i.e., items constituting an episodic event), we might anticipate that patterns of reported speech use would be disrupted. Indeed, traditional accounts of reported

speech as simply a veridical report of a past speech event lead to the prediction that there would be an absence of reported speech referring to relatively recent events from the post-amnesia-onset past (i.e., from the period of anterograde amnesia), but with a preservation of reported speech referring to more remote events from the pre-amnesic past (from the remote past outside the period of retrograde amnesia). Interactional sociolinguistic perspectives, which focus on the discursive and creative representation of temporal events, might suggest more complex patterns of disruption, or conceivably no discernable disruption at all. Finally, sociolinguistic studies of communicative accommodation, in which the productions of one person in an interaction often shape the subsequent productions of others (as when interlocutors come to match rates of speech) (e.g., Giles, Coupland & Coupland, 1991), lead to the prediction that any disruptions in reported speech productions by amnesic participants would affect clinician productions as well.

Analyses of the interactional discourse samples from individuals with amnesia and from healthy comparison participants, each communicating with the first author, permitted examination of: (1) the extent to which participants with amnesia and the clinician use reported speech in their interactional discourse sessions (i.e., number of reported speech episodes), the types of reported speech used, and the temporal domains represented in the events of the reported speech episodes; (2) comparisons between the reported speech use of participant with amnesia and neurologically intact participants, in terms of frequency of use and type of reported speech forms, and the temporal periods represented in their reports; and (3) the interactional nature of reported speech use in these sessions, i.e., how reported speech is collaboratively produced and taken up by the participants and the clinician, for both amnesic and comparison participants.

METHOD

Participants and data set analysed

The analysis of reported speech was completed on interactional data obtained during discourse sampling sessions conducted by the lead author with each of 18 participants, 9 individuals with amnesia and 9 comparison participants. [1] Of the nine participants with amnesia, seven had sustained bilateral damage restricted to the hippocampus from an anoxic/hypoxic event (e.g., cardiac arrest, status epilepticus)[2] and two had sustained more extensive bilateral brain damage including to the hippocampus, amygdala, and surrounding cortices from herpes simplex encephalitis (HSE). At the time of data collection, all nine participants were medically stable and in the chronic epoch of amnesia, with time-post-onset ranging from 1 to 25 years (M = 9.33; SD = 7.1). The Wechsler Memory Scale–III General Memory Index scores for each participant were at least 25 points lower than their scores on the Wechsler Adult Intelligence Scale–III, and the mean difference between Full Scale IQ and General Memory Index was 31.2 points. The average Delayed Memory Index was 65.3, almost 3 standard deviations below population means. Finally, the participants with amnesia were on average 50 years old (range 42–58) and had 14 years of education (range 9–16). The nine normal comparison participants (NC group) were all healthy non-brain-injured individuals. NC participants were matched pairwise on sex, handedness, age, and education to each participant with amnesia.

The data were collected using a mediated discourse-elicitation protocol designed to support ecologically valid interactional discourse sampling in a clinical setting by putting the clinician in the role of conversational partner (Hengst & Duff, 2007). The goal of the data collection

[1]All participants were drawn from the Amnesia Research Laboratory at the Beckman Institute at the University of Illinois or the Patient Registry of the Division of Behavioral Neurology and Cognitive Neuroscience at the University of Iowa. Data collection and analysis was conducted under IRB approval from both institutions.

[2]For a detailed description of the neuroanatomical data for five of these participants see Allen, Tranel, Bruss, and Damasio, 2006.

sessions was to obtain approximately 30 minutes of conversational-based interaction between the clinician and target participant and, within this conversational framework, to move through a set of targeted discourse tasks. Consistent with discourse studies of adults with neurogenic disorders (see Cherney, Shadden, & Coelho, 1998), the targeted discourse tasks were: one 10-minute conversation; three story-telling prompts (frightening experience, historical event, family story); three picture descriptions (Cookie Theft, Normal Rockwell, World Trade Center); and three procedural descriptions (making a favourite sandwich, shopping in an American grocery store, changing a tyre). Throughout the session the clinician participated as an appropriate interactional partner for discourse activities (e.g., as an audience to participant's story telling). Thus, the sessions yielded both pre-selected (i.e., target tasks) and spontaneous (i.e., between-task) interactional discourse for analysis. All sessions were videotaped and transcribed to support situated discourse analysis.

Data analysis

Through repeated viewings of the videotapes, supported by use of the transcripts, we analysed reported speech use throughout the sessions, which included reported speech produced by the clinician and the participants during both target discourse tasks (e.g., picture description) and non-task interactions (e.g., small-talk between target tasks). The analysis was completed in four phases. First, using a broad definition of reported speech, research assistants identified all possible reported speech episodes (RSEs), yielding 2943 possible RSEs. In the second phase, these possible RSEs were reviewed by the first two authors and recoded in order to omit RSEs that were directly read (e.g., clinician reading instructions), non-explicit representation of other's speech (e.g., *We talked for hours*), clinician's prompts for talk (e.g., *I'd like for you to tell me about a frightening experience*), and immediate, unframed repetitions of each other's speech (e.g., *I don't want to. Yeah, I don't want to*). In addition, during this review, turn and speaker boundaries for each RSE were reviewed, and nine RSEs were reinterpreted as simply continuations of adjacent episodes. At the end of this second phase, 827 explicitly marked RSEs, or approximately 30% of those initially identified, were retained for further analysis. In the third phase, the lead author categorised each of the 827 RSEs as one of five reported speech types (described below) and identified each as either accurately and completely produced or as containing errors (e.g., false starts, grammatical errors) and/or being incomplete (e.g., abandoned or interrupted). Finally, in the fourth phase the lead author analysed the temporal domain represented by the reported context (see below) for each RSE.

Coding types of reported speech—For this analysis, we used five explicitly marked reported speech types (direct, indirect, indexed, projected, undecided) developed by Hengst et al. (2005). In *direct reported speech* the represented speech is presented as a quotation, as if reporting the exact words of the original speaker (e.g., *Get a call later … "Roger somebody called. They can't get their car started"*). In *indirect reported speech* the represented speech is presented as a paraphrase of the original speaker's words (e.g., *One of them said she wants to hand out candy*). In *projected reported speech* it is understood that the represented speech has never actually been said—i.e., what might have been said, but wasn't; what will or should be said in the future; or what animals or objects might say if they could speak (e.g., *"I brought my wrong glasses" is what I should say*). In *indexed reported speech* the represented speech is not actually presented, either directly or indirectly, but is simply pointed to, or indexed, often with deictic pronouns or demonstratives (e.g., *That's what I was going to ask you*). Finally, the *undecided* category captures reported speech that cannot be easily categorised into one of the above types, such as blended forms, or episodes that contain multiple linguistic errors, were abandoned, or were interrupted (e.g., *I I wouldn't say I'm cause I have a couple of sisters that are a lot funnier when they tell a story*).

Coding temporal domain of reported context—To identify the temporal domains that participant were discursively managing within RSEs, we categorised the reported context into one of four temporal domains: *past, in-session, future*, and *unspecified*. The *past* domain included reported contexts from across the lifespan, ranging from childhood through recent past up to the beginning of the session. In order to code the reported context as past, the RSE or surrounding discourse needed to contain a reference to a specific past time or event (e.g., *When I went to the Breeder's Cup in 2000* …). The *in-session* domain included reported contexts from the immediate past, specifically within the data collection session. This category included RSEs that had a within-session temporal reference (e.g., *And like I said earlier I'm interested* …), indexed reports of something said within the session (e.g., *That's not what I said*), and the hypothetical, or projected, reports that participants often used during target discourse tasks (e.g., giving voice to characters in the picture description: *And the girl said … saying, "shh be quiet"*). The *future domain* included reported contexts that were anticipated or forthcoming, typically presented as projected reports (e.g., *I'm gonna call him and tell him this is unacceptable*). The *unspecified* domain included reported contexts that were vague, ambiguous, or not specified. However, this also included RSEs produced within jokes (e.g., *One guy says, "I used to have a problem but now that I'm all better, its just that I know I'm perfect is my only problem"*) and representations of habitual thoughts or speech (e.g., *I always think that if I get some more time I'd like to take piano lessons*).

Reliability

Point-by-point inter-rater and intra-rater reliability of coding of the five types of reported speech and the temporal domains of each RSE was obtained on 10% of the data. Five consecutive RSEs for each of the 18 sessions were selected. The original researcher-coder and a researcher unfamiliar with the data independently recoded the data. Intra-rater and inter-rater reliability was 94% and 87% for RS type an and 93% and 84% for temporal domain, respectively.

RESULTS

Frequency and type of reported speech

Across the data set, reported speech was available to, and used by, all participants and the clinician in all 18 sessions analysed, with a range of 1–78 episodes produced per person per session. However, on average only half as many RSEs were produced in the amnesia discourse sessions (M = 30.3; SD = 16.9) than in the NC sessions (M = 61.5; SD = 30.1), a difference that was significant, $t(16) = 2.713$, $p = .015$. This difference cannot be attributed to a more limited production of RSEs by the amnesic participants alone. During the amnesia discourse sessions, both the participants and the clinician produced fewer RSEs than during NC sessions. In NC sessions the clinician produced 28% of the total 554 RSEs (participant RSEs = 400; clinician RSEs = 154), and in amnesia sessions the clinician produced 32% of the total 273 RSEs (participant RSEs = 185, clinician RSEs = 88). Finally, across all sessions, the majority of RSEs were coded as completely and accurately produced, with an accuracy level of 88.9% in NC sessions (participant productions at 87.75%, clinician productions at 92.2 %) and an accuracy level of 84.6% for amnesia sessions (participants 83.2%, clinician 87.5%).

All five types of reported speech were used in these sessions. Across all 18 sessions, direct reported speech was produced most often, accounting for 43% (359/827) of total RSEs. Indirect and projected reported speech were produced less often, accounting for 18% (151/827) and 10% (84/827) of total RSEs, respectively. Productions of indexed reported speech were surprisingly high, accounting for 21% (174/827) of total RSEs. However, the majority of indexed reports were produced by the clinician during her management of the target discourse tasks (e.g., *Do you want to add or change anything to that?*). Only 7% (59/827) of total RSEs

were coded as undecided. Figure 1 displays the distribution of total RSEs by type and participant group.

Beyond overall differences in the total number of RSEs produced, we were interested in whether there were differences in the use of reported speech types between groups. Focusing on the productions of the NC participants and participants with amnesia, we calculated the proportion of RSEs per person and by type for each group. Using a two-tailed Wilcoxon matched pairs signed rank and a Bonferroni correction for multiple comparisons (alpha of 0.01) we found no significant group differences for type of reported speech: direct RS ($Z = -0.65$; $p < .51$), indirect RS ($Z = -2.075$; $p < .038$), projected RS ($Z = -1.12$; $p < .26$), indexed RS ($Z = -2.433$; $p < .015$), undecided RS ($Z = -1.66$; $p < .096$). The stringency of the Bonferroni correction increases the risk of Type 2 errors. It is worth noting that, consistent with visual inspection, statistically significant group differences would have been observed for indirect and indexed reported speech without the correction, suggesting that there may be group differences for these types of reported speech.

Temporal domains of the reported contexts

Analysis of the reported contexts of the 827 RSEs revealed that all four temporal domains, *past, in-session, future*, and *unspecified*, were represented, and that the distribution of temporal domains was similar between groups. Across all sessions, 55% (456/827) of the reported contexts were coded as past, 24% (197/827) were coded as in-session, and 19% (155/827) were coded as temporally unspecified. Only 2% (19/827) were coded as having a future reporting context. We examined whether the proportion of RSEs of each of the four temporal domains produced by participants only (without clinician productions) differed between groups using a two-tailed Wilcoxon matched pairs signed rank test and a Bonferroni correction for multiple comparisons (alpha of 0.0125). No significant group differences were observed: past ($Z = -1.7$; $p < .08$); in-session ($Z = -1.2$; $p < .21$); future ($Z = -1.4$; $p < .17$); and unspecified ($Z = -0.77$; $p < .44$).

The finding of no group difference in the distribution of temporal domains represented in the reported contexts was surprising. Our clinical impressions, as well as our preliminary review of the data, suggested that the participants with amnesia had difficulties communicating about past events, and we anticipated that this would be reflected in a smaller percentage of past reported contexts within RSEs produced during amnesic sessions. One possible explanation was that any difficulty in discursively managing past reported contexts might be limited to the recent past (i.e., post-onset of amnesia), with the remote past (i.e., pre-onset of amnesia) reported contexts undisturbed. Such a subcategory disruption might have been masked in our original analysis, which combined all past reported contexts into one category. To further investigate this possibility we analysed the 106 RSEs with past reported contexts that were produced by participants with amnesia, subcategorising each as having a reported context of pre- or post-amnesia for the target participant. This was surprisingly easy to do as participants with amnesia frequently referred to their memory impairments, often using the onset of amnesia as a way to discursively organise events (e.g., *before my brain injury*). In other cases, participants referenced salient events (e.g., childhood vacations) that, within the broader conversation, could be easily located in the participant's life. In the few cases in which the pre/post amnesia distinction was not clear, the specific temporal references were compared with information available in medical records.

This follow-up analysis revealed that, although past reported contexts of RSEs produced by amnesia participants included both recent and remote past temporal domains, the majority of reported contexts were coded as pre-amnesia. For all 106 RSEs, 59% (63/106) were coded as pre-amnesia and 41% (43/106) as post-amnesia. However, the two HSE participants, who had the most extensive brain damage, did not produce any RSEs with post-amnesia reported

contexts. Indeed, these two participants together only produced six RSEs with past reported contexts, and all six of these were coded as pre-amnesia past. It was striking that not once during these sessions did either HSE participant produce a RSE with a reported context representing a temporal domain after the onset of their amnesia, a time period of 25 years for one participant.

It was also our impression that RSEs produced by amnesic participants with a pre-amnesia reported context were qualitatively different from those with a post-amnesia reported context. Those with pre-amnesia reported contexts often seemed indistinguishable from RSEs produced in NC sessions or by the clinician in amnesia sessions—they were animated (e.g., use of gestures, changes in voice quality), detailed, and covered a diverse range of topics (e.g., families, pets, work, schooling). In marked contrast, RSEs with post-amnesia reported contexts seemed less detailed, or specific, and more topically limited, with the most common topic being the impact of amnesia in their daily lives (e. g., *He'll say things like … "well do you remember to take a shower every night?"; They said I have long-term memory; I'd cover the same topic and over and over and over and over and because I couldn't remember that I'd asked the same question five minutes ago; I couldn't really remember where he said he was gonna be*). In fact, when we reviewed the topics for all post-amnesia RSEs we found that 74% (32/43) focused on the participants' memory problems or amnesia, and many of these reports were repeated throughout the session.

The interactional character of reported speech in these sessions

The mediated discourse elicitation protocol, which works to establish the clinician as a conversational partner throughout the session, also allowed us to begin to document the interactional character of reported speech in this data set. Functionally, reported speech was diversely deployed within the sessions and in support of different functional goals. By assigning all utterances to an interactional discourse activity—either one of the four target discourse types (e.g., conversation) or the more general talk that occurred between target tasks—we documented which discourse activities supported the most reported speech production. Although reported speech was used throughout the session, interestingly, across both groups, the majority of RSEs (51%, or 333/827) occurred during the between-task talk. For RSEs that occurred during the target discourse activities, most were produced during the conversational and narrative tasks, 31% (254/827) and 23% (189/827) respectively, with few produced during picture and procedural description tasks, each at only 3% of the total RSEs (24/827 and 22/827 respectively). Across these discourse activities, reported speech episodes were used to give voice to fictional characters, to project possible discourse, and to provide details and animate voices of narratives.

In these sessions there was also evidence of more collaboratively produced RSEs—i.e., episodes in which the discursively constructed social and temporal frames established by one partner were taken up by the other partner in the production of reported speech. Two marked examples of collaborative productions were episodes in which both speakers jointly produced the represented speech, and episodes in which the RSE was set up, or framed, by the previous speaker. For example, in joint constructions, the represented speech that was initiated by one speaker, either the clinician (Cl) or the participant with amnesia (AP), was completed by the other one, as seen in the example below:

AP:: And it's like well … you know "I just-"

Cl:: "I don't want to."

In examples of collaboratively framed episodes, the speaker depends on a framework set up by their conversational partner, as seen in the example below:

Cl:: So I watch … this person being killed and then I go to bed and I'm you know lying there going, "well."

AP:: "Did I hear something?"

The most intriguing examples of these collaborations were multi-turn, hypothetical conversations jointly enacted by both partners. During these play-conversations the conversational partners would both slip into character voices (without verbal set-up) and respond to each other's utterances within the established play frame, either sharing the same, or speaking from different, character roles. In the transcript below, a participant with amnesia (AP) sets up a frame in which she, as a store clerk, doesn't know how to help a customer. Then both the AP and the clinician (Cl) enact the scenario by directly reporting what the store clerk might say to a customer:

AP:: Especially if a customer comes and wants to buy something. I'm just like, "what is that?"

Cl:: "Come pick it out."

AP:: "Yeah. Do do you know what it looks like?"

Cl:: "Show me what it looks like"

All 827 RSEs were reviewed to identify examples of marked collaborative production and uptake of reported speech (i.e., jointly produced represented speech, collaboratively framed episodes, and/or play-conversation). This review documented marked collaboration in 14 of the 18 sessions. Perhaps not surprisingly, we documented more of these examples in NC sessions (17 examples documented across all nine sessions) than in amnesia sessions (9 examples documented across five sessions). It is also interesting to note that none of these marked collaborative RSEs were produced in the sessions with the two HSE participants.

DISCUSSION

The current findings accord with interactional sociolinguistic perspectives that conceptualise reported speech as a pervasive, robust, and creative discourse form. Here, reported speech was available to, and successfully used by, the clinician and all 18 participants, and of the 827 reported speech episodes identified for analysis, the vast majority (>80%) were produced accurately (i.e., without linguistic errors) and completely (i.e., not interrupted or abandoned). In addition, all types of reported speech analysed (e.g., direct, indirect, indexed) were identified. Of particular interest here, of course, was the comparison between amnesic and neurologically intact participants. There was no significant group difference in the types of reported speech produced by participants with amnesia and the comparison participants. But, despite such clear evidence that the amnesic participants had sufficiently preserved linguistic abilities to accurately produce a variety of reported speech forms, as a group they produced only half as many reported speech episodes during these sessions as the comparison participants.

If there were a simple relationship between episodic memory abilities and the discursive representations of past time frames of reported speech, we might suspect that the lower reported speech use by amnesic participants would be accounted for by a sharp reduction of reported speech episodes from the period of their anterograde and retrograde amnesia. However, this was not the case. Not only did participants with amnesia produce reported speech contexts representing all four temporal domains (i.e., past, in-session, future, unspecified), but also, proportionally, we found no significant difference in the distribution of temporal domains used between groups. In addition, despite their severe anterograde declarative memory deficit, the participants with amnesia were not limited to the remote (or pre-amnesia) past, but also used

representations of recent (or post-amnesia-onset) past. However, discourse analysis of those reported speech events referring to relatively recent episodes from the post-amnesia-onset period did find indications of disruption. Impressionistically, these episodes seemed more schematic, less detailed, and more prone to breakdown. Moreover, the majority of them dealt with the highly salient, daily experience of the participants' memory problems and amnesia; there was no single topic that was as current and salient to serve as a comparison event in the NC participants' reported speech.

The interactional analysis of reported speech use in these sessions pointed to more similarities than differences for the amnesia and comparison participant groups. Specifically, both groups displayed a similar pattern of reported speech use across discourse activities (i.e., conversation, picture description, procedural description, story generation, between-task talk), and reported speech episodes with marked collaboration (i.e., jointly produced and collaboratively framed episodes and play conversations) between the clinician and the participant. In addition, the clinician's production of reported speech tracked with the participants' productions, whether with the higher use of reported speech episodes of the comparison group, or the lower use of the amnesia group. Although the dynamics that led to this attunement await further study, these findings make it clear that production and use of reported speech in these sessions were shaped by emergent interactional phenomena.

Although we did not check the veracity of the reported speech episodes, the findings presented here are consistent with previous research demonstrating that individuals with amnesia can produce remote autobiographical memories (Tranel & Jones, 2006) and with as much detail as individuals without brain injuries (e. g., Bayley, Hopkins, & Squire, 2003). However, findings from the current study suggest that even when producing vivid remote memories, individuals with amnesia are less likely to use reported speech as a communicative resource when representing these memories in communicative interactions. This may be because, although the static display of remote memories becomes independent of the hippocampus over time, the hippocampal system plays a critical role in the flexible expression of memory in novel situations (Cohen & Eichenbaum, 1993; Eichenbaum & Cohen, 2001). Reported speech requires flexible access to the larger temporal record of events as well as the ability to flexibly and creatively generate unique combinations of the elements of the representation to be reconstructed (what details to represent, what details to omit) to meet specific interactional goals. This flexibility and creativity would seem essential to forming both past and future or anticipated representations. Thus, although sociolinguistic perspectives de-emphasise the importance of veridical declarative memories in reported speech use, hippocampal damage, in addition to disrupting reported speech use for episodes referring to the post-amnesia-onset period, may also impair the creative and interpretive uses of reported speech events from all time periods in communicative interactions.

An intriguing finding, not fully explored here, was that the reported speech use by two HSE participants was clearly more restricted. In the qualitative analysis presented here, the HSE participant stood out as the only two participants with amnesia who produced no episodes of reported speech referring to events in the post-amnesia-onset period and no episodes with marked collaboration. Although the data were not broken out above, these two participants produced a markedly lower number of RSEs overall (7.5 on average per session) than the other seven participants with amnesia (24.3 on average per session). Critically, these observed differences in frequency of reported speech use do not appear to be due to the severity of the declarative memory impairment; for example, a participant with anoxia, whose IQ–MQ (memory quotient) difference was greater than that of either of the two HSE participants, produced more than twice as many RSEs as any other participant with amnesia. Instead, the paucity of reported speech use by the HSE participants may be related to the fact that their brain damage extends beyond the hippocampus. A potentially related observation in other

patients with extensive medial temporal lobe and limbic system damage is disruptions in, and particularly a lessening of, emotions and motivations (e.g., O'Conner, Cermak, & Seidman, 1995; Tate, 2002). Tate (2002) posits that these blunt or shallow emotional responses may not be limited to an individual's own altered life circumstances but may also extend to their interpersonal relationships. Tannen (1989) has argued that reported speech is a key discourse resource for the ongoing display and creation of interpersonal and interactional involvement among interlocutors. In this sense, it is interesting that the most striking disruptions in reported speech use were in the HSE participants, who had more extensive brain damage, and whose sessions were marked in multiple ways by a lack of interactional engagement. This finding suggests that the use of reported speech may also critically rely on other brain systems that support, more generally, reciprocal social-emotional communication (e.g., amygdala, ventromedial prefrontal cortex).

Understanding the relationship between memory and language and the neural substrates supporting everyday language use are core themes in neuroscience, neuropsychology, and speech pathology. In the current work, we did not observe deficits in basic linguistic mechanisms in amnesia; rather, individuals with amnesia used all forms of reported speech. Instead, the difference between amnesic and comparison participants was in the less frequent use of this form of discourse by those with amnesia. Given that reported speech seems to place great demands on maintaining, relating, and flexibly moving back and forth (mentally) between different time frames, the finding here, that reported speech is called upon less often in individuals with damage to precisely that memory system—declarative memory—thought to support such memory demands, makes good sense. Thus, even if amnesia is specific to an aspect of memory, it can exert its effects in other cognitive domains when the processing in those domains places large demands on memory. Language-in-use in actual interaction among participants involves more than basic linguistic mechanisms, invoking memory and presumably other cognitive capacities. Indeed, when we shift our investigation to understanding the nature of language-and-memory-in-use in communicative interactions, the distinctions between memory and language become less clear, and we would argue, less important.

Finally, findings from this study point to the value of research protocols designed to focus on social interaction and the systematic examination of interactional aspects of communication, suggesting that this is a promising approach in the empirical study of brain–behaviour relationships. Indeed, in previous work (Duff, Hengst, Tranel, & Cohen, 2006) we found this approach to be robust for promoting and documenting new semantic learning in severely amnesic individuals as they interacted with a familiar partner across a series of collaborative interactions. Drawing attention to the functional systems of social interaction reveals the complexity of communication in context, which seems to have greater ecological validity than typical laboratory tasks, and has direct clinical application for understanding the functional impact of cognitive-linguistic deficits in everyday interaction, and how language and memory impairments can be accommodated to support successful communication.

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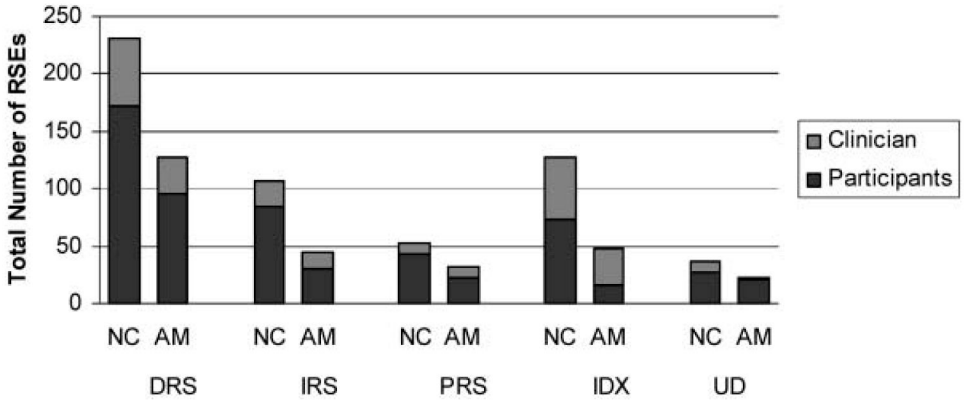

Figure 1.

Total number of reported speech episodes (RSEs) by type and group. NC, normal comparison; AM, amnesia; DRS, direct reported speech; IRS, indirect reported speech; PRS, projected reported speech; IDX, indexed reported speech; UD, undecided.