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Authors
Lippa, Katherine D.
Shalin, Valerie L.

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Distributed Cognition in the Past Progressive: Narratives as Representational Tools for Clinical Reasoning

Katherine D. Lippa (lippa2@gmail.com)
Department of Psychology, 3640 Colonel Glenn Hwy
Dayton, OH 45435 USA

Valerie L. Shalin (Valerie.shalin@wright.edu)
Ohio Center of Excellence in Knowledge-Enabled Computing (Kno.e.sis)
Department of Psychology, 3640 Colonel Glenn Hwy
Dayton, OH 45435 USA

Abstract

Cognition may require access to past events, for example to understand undesirable outcomes or diagnose failures. When cognition is distributed between multiple participants, a particular representational challenge occurs because not all of the participants may have directly experienced the focal event. Language can transcend temporal and physical limitations on event accessibility. We suggest that people create complex linguistic constructs as tools to facilitate retrospective cognition. We illustrate this process by analyzing the use of a particular linguistic construct (narrative) in the domain of clinical reasoning. Results demonstrated that narratives support clinical cognition during practitioner-patient interactions. Narratives extended access to clinically relevant events providing information about circumstances, subjective experiences, patient functioning, and prior decisions. Whereas, the hermeneutic nature of narrative allowed collaborative hypothesis testing and creation of meaning. The use of narrative in clinical cognition challenges Bruner's (1991) distinction between narrative and paradigmatic reasoning and enriches the understanding of medical narratives.

Keywords: distributed cognition; medical cognition; narrative; doctor-patient interaction

Introduction

Retrospective cognition is often required to understand adverse events. Whether people are attempting to understand intelligence failures after a terrorist attack, the origin and significance of a technical error, or the evolution of a disease, the reasoning task creates representational challenges. The onset of the focal event may not have been recognized in real time and significant aspects of the environment may have been missed or misinterpreted. Crucially, those involved in retrospective analysis may not have directly experienced the events in question. All of these properties make retrospective cognition dependent on representations of past experience suitable for exchange with reasoning partners. Some of these representations take the form of physical tools, such as record systems. But others are ephemeral linguistic compositions. In this paper, we analyze how one representational medium, medical narrative, is used as a psycholinguistic tool for overcoming the challenges of retrospective cognition distributed between patient and practitioner.

Language as a Cognitive Tool

Research has established the cognitive utility of language for both individual and distributed cognition. On an individual level, the use of words facilitates myriad cognitive processes including perceptual discrimination, memory, and attention (Yoshida & Smith, 2005; Fulkerson & Waxman, 2007). Moreover, the semiotic functions of language provide an organizational structure for people to effectively parse their environment (Bloom & Keil, 2001).

The semiotic connection that language creates between thought and the environment (Clark, 2006) is especially significant during distributed cognition. Under this paradigm, the unit of analysis for cognitive functions includes environmental artifacts and other participants (Hutchins, 1995.) When cognition is distributed between participants, language acts synergistically with cognition, physical context and culture to create a space for interaction (Cowley, 2011). Whether an actor is in the next room or on the other side of the planet, the distribution of cognition across space requires language to extend the interaction space (Tylen, et al., 2010). Similarly, when actors have access to different portions of the environment (e.g. they are working on different displays or have specialized expertise that allows them to understand particular aspects of the environment) language allows them to create mutually accessible representations of key environmental elements (Bødker & Anderson, 2005).

Participants naturally track aspects of the environment under discussion, creating a joint focus of attention (Eberhard, et al, 1995). Moreover, language allows actors to monitor each other's understanding and coordinate task performance (Bangerter & Clark, 2003). However, these basic utilities of linguistic communication regard its function as the assertion of propositions. Larger linguistic constructs, such as narrative, are complex, intentionally constructed representations. In contrast to the fixed tools of a task environment such as displays, constructed representations are emergent, and are both shaped by and shape thought processes (Chandrasekharan & Nersessian, 2015; Nersessian, 2009).

Narrative[1] Cognition

Several scholars link narrative and cognition (Bruner, 1991; Pennington & Hastie, 1992; Bower, Black & Turner, 1979). Notably, Bruner has suggested that narrative constitutes a unique form of cognition divorced from paradigmatic (i.e. logical, scientific) thought. Under Bruner's conception, narrative cognition has 10 core properties: diachronicity, genericness, canonicity and breach, normativeness, particularity, intentional state entailment, hermeneutic composability, context sensitivity, referentiality, and narrative accrual. Despite the fact that Bruner proposed a dichotomous separation between narrative and paradigmatic thought, many of these narrative attributes may facilitate conventional cognitive functions.

Narrative facilitates the organization of individual pieces of information into a coherent whole. On a temporal level, the creation of a narrative entails the (re)configuration of events into a unified structure that orders individual events within a coherent 'plot' (Ricouer, 1980). Narrative genres guide attention with a template for the inclusion, structuring and presentation of particular elements (Barthes, 1975). Organizational advantages explain the benefit of narrative on memory (Bower, Black & Turner, 1979).

Narratives offer more than structure for representing events. Narratives facilitate event reasoning. The reasoning involved in narrative composition includes causal argument. The temporal nature of narrative facilitates abductive reasoning. Some theorists advocate that all narratives are causal arguments employing *post hoc ergo propter hoc* logic (Robinson & Hawpe, 1986). These intermingled processes of reasoning and narrative composition result from a single individual or emerge as part of a social dynamic as two or more actors co-construct a narrative (Ochs, Smith and Taylor, 1989). The co-construction of narratives suggests its utility for distributed cognition.

Research also suggests that narratives may suit reasoning about complex environments. The combination of particularity and genre conventions allows narrative to generate theory by filtering noisy data in recognizable patterns. Dubba et al. (2012) have shown this effect in an AI system for modeling an airport through spatio-temporal narratives. Their work demonstrates the understanding of a dynamic domain by combining inductive and abductive processes through a narrative framework.

Narratives in Medicine

The conventional medical decision making research paradigm focuses on the reasoning of individual physicians with factual data. Yet, patients share narratives with practitioners by recounting acute episodes and elements of their medical history (Haidet & Paterniti, 2003). Both practitioners and patients use narratives to understand illness related events following a clinical encounter. (Hunter, 1991; Crossley, 2000). Nevertheless, there is little understanding of the role narrative plays in distributed physician-patient clinical cognition. In this study, we look at the cognitive significance of narratives for physicians and patients managing Multiple Sclerosis (MS).

Methods

We observed 24 patients with MS interacting with 3 medical practitioners (2 neurologists and 1 nurse practitioner) at a university neurology clinic. Clinical sessions were audio recorded (n=10) or documented with field notes (n=14). Follow-up interviews with all patients were audio recorded within 2 weeks of their appointment. All audio recordings were transcribed using a literary transcription method. Field notes were elaborated immediately after each clinical session and original notes were retained for comparison.

Narratives (defined as speech describing one or more particular events and including temporal, evaluative and contextual components) were identified in the transcripts and notes. More than a year later approximately 25% of the corpus was recoded to verify coding reliability, resulting in Kappa = .82 (CI .78-.86).

All narratives were examined in successive rounds of analysis. Initial analyses verified the elements of narrative as defined by Bruner (1991) in this context. Subsequent analysis focused on identifying patterns concerning the cognitive and pragmatic utility of these narratives in the clinical context. Once patterns of use were identified, the set of narratives was reanalyzed for how those patterns manifested and varied. We used an additional focused coding scheme to identify causal reasoning and the use of functional descriptions, establishing reliability with a second independent rater (Kappa=.63 [CI .41-.85]). All of the patterns described below appeared in both the notes and the transcripts. To allow for greater depth of discussion specific examples below are taken from transcripts.

Results

Eighty-eight narratives were identified including one or more from each clinical session and interview. A sample of these appears in Table 1. In the discussion below, we analyze and provide examples of how narrative served as a tool to facilitate a variety of cognitive functions. As representations of external events, narratives provided joint access to clinically relevant content including contextual information. They helped focus attention on specific issues and relevant parameters for understanding those issues. Finally, they facilitated causal reasoning, and the integration of intentional and metacognitive components into clinical cognition.

[1] There are many definitions for narrative (Bruner, 1991; Ricoeur, 1980; Labov, 1997). In this study, narrative is defined as a recounting of events with temporal, evaluative, and contextual elements.

Table 1. Narrative Exemplars

Example 1 (male, 40s, minimal disability, college educated) Patient: Um, two weeks ago I had a um, um I guess an episode is what you'd call it. Um where I had a visual problem. I had kind of a backwards c shape blurry spot, you know in my vision, and it lasted about ten minutes… Practitioner: Did you have optic neuritis before in that eye? {Uh}[2] Like did you lose vision before? Or have blurry vision for some time before in that eye? Patient: Um, I've had a what people have told me it's called a like floater in my eye for a long {uh huh} time. Since like 93, 94. I have like uh like uh I haven't experienced that kind of loss of field in my eye before. And as I sat there I thought you know is it the right or the left, so {ok} then I you know closed my right and checked and then closed my left and checked and it seemed like it was in both, so it didn't seem like it was in one or the other in particular. And so then I closed both eyes and you could still like when you sit down and stare at a light bulb you still got that kind of greenish. Well it was still there… Practitioner: How big was it? Patient: Um, it was fairly large. I mean um I guess it was kind of like a field in my vision and I guess if I was looking at my computer there were certain portions where I was looking where I wouldn't be able to see what I was typing, because it would be obscured by the blurriness. Practitioner: [Do you get migraines? Patient: No, I do have headaches but I've never experienced what people told me is a migraine… Patient's Wife: He had me drive home it scared him that much… Practitioner: But it lasted only half an hour right? Patient: I don't even think it lasted that long? I know on Friday it only lasted 10 minutes because when it started I thought 'well this is unusual' and I looked at my watch and I wrote down in my notebook… Practitioner: Cause usually like MS attack would last it has to last more than 24 hours right, so we wouldn't consider it MS attack. What you describe to me is not really what sound like {but} MS related problem.
Example 2 (female, late teens, minimal disability, high school educated) Practitioner: Ok. Difficulty walking? Difficulty with balance? Patient: there was an episode that I had when I lived with my grandma. She has carpet floors and I got up for school. This was when I was still in school. I got up for school that morning in my bedroom to get dressed. And when I got up I felt fine, but when I started to walk I fell and I hit the carpet with my head. Practitioner: ok, oh really, wow, so you had a fall. Do you get dizzy?
Example 3 (male, 40s, significantly disabled, college educated) Practitioner: Which medication helps you the best? Pain medication? Patient: Hydrocodone, the Methadone, the Methadone seemed to help a lot. But when I tried to get off the Methadone, which I did…It was, it was the worst thing that's ever happened to me. Practitioner: What happened? Patient: Um, my body went into the worst type of shock. Just withdrawal and shock. Uh,uh,uh. I never want to take anything that my body becomes that reliant on. {yeah} I mean it hurt. It hurt so bad I would lay in home in bed. The sweats were so bad and I was freezing cold. I had cloths on, a down comforter on, I had a heater blowing on my body, and I could not get warm and I am just shaking so bad. I was seeing things, got a bad headache. When I go go to the restroom it was terrible. Didn't eat, dropped probably about 15 pounds in a week because I didn't eat any food.

Narrative Cognition and Representation

Medical decision making research paradigms notwithstanding, real clinical reasoning depends upon a great deal of information that the practitioner cannot directly access either because it is phenomenological or concerns events outside the clinic. Practitioners must know about the qualitative nature of symptoms and the context, sequence and timing of episodes for diagnostic purposes (Lippa & Shalin, 2015). The patient must bring these subjective and environmentally distributed elements into the clinic (Lippa, et al., submitted). The participants in this data used narratives as a tool for bringing external events into the clinic. This mutually accessible representation of events, helped guide joint attention and provided anchors for understanding subjective symptom reports.

Contextualization Narratives often began with a broad sketch of the environment, including both temporal and other contextual elements. Many of the narratives incorporated a reference to temporal context that was either calendar based, as in example 1 "two weeks ago" (43% of the corpus) or tied to key events in the participant's life, as in example 2 "when I lived with my grandma". One patient even used events from the news as a temporal referent. The specification of temporal attributes converges with a physician's interest in the recency of an event as an indicator of meaning. Older narratives indicate the

[2] {} denote minor interjections.

persistence of experience of increased import, while more recent narratives may reflect fortuitous and transient events of limited significance to disease. The provided contextual overviews varied a great deal including information about the patient's case history, personal background, emotional state, physical location, etc.

Event Classification Having situated events in context, narratives typically focused on a particular problem. This problem became the plot of the narrative to which all subsequent particulars and events needed to relate. Sometimes the patient began the narrative with a clear understanding that the events described constituted a problem and the function of the narrative was to draw attention to the focal problem and provide information to facilitate distributed problem solving. But in many cases, this information helped classify whether and to what extent the central events constituted a MS related problem. Example 1 includes both functions. The patient immediately concluded the symptom was disruptive and notable. This is clear from the fact that he wrote down the exact time of onset. We believe that he told his story hoping the practitioner would clarify the parameters of the problem and their relationship to MS. When she ended the discussion without a clear explanation, he was confused. He expressed this confusion during the follow up interview: "*I couldn't really understand what she's saying about it but what I got from her was that she didn't really think it was MS related so I don't know what to think now*."

Inclusion of Detail In MS management narrative genres appear to be co-constructed by patients and practitioners (for a similar effect in psychotherapeutic settings see Sluzki, 1992). As patients and physicians interact, the physicians' questions help patients to define what aspects of their experience are relevant to MS management. We see this in example 1 when the practitioner asks first about the specifics of the symptom ("*How big was it?*") and later about the time course ("*But it lasted only half an hour right?)*. The patient could have chosen to respond to each question with a brief statement of facts, but instead he responded with extensive descriptions –mini-narratives by themselves. The practitioner's questions showed which aspects of the narrative she was attending to and directed the patient's attention to elements worth elaborating. This type of interaction signals to patients the kinds of information to include in clinical narratives. Over time they learn to tell stories that incorporate the specific information that physicians need (for a discussion of this process see Lippa & Shalin, 2015).

Functional Anchoring In addition to the basic leveraging of narrative structure described above, patients used narratives about functioning to anchor otherwise amorphous symptom descriptions. In most of the narratives in this study, including examples 1, 2 and 3, at some point patients directly reported their experiences (e.g. *I had kind of a backwards c shape blurry spot, you know in my vision; I felt fine; it hurt so bad)*. Such descriptions were often insufficient, employing ambiguous terms. A mutually understood anchor conveyed a more specific meaning.

To meet this challenge, patients often included supportive functional descriptions for subjective reports, or emphasized clinically relevant information in their narratives. Twenty nine functional descriptions appeared in 26 distinct narratives (30% of the corpus). In example 1, the patient addresses one of the practitioner's questions about the characteristics of the symptom by providing details concerning how the symptom affected his living activities, in this case, work at the computer. Other functional descriptions convey a sense of magnitude. In example 3, the patient emphasizes the severity of his pain by saying he couldn't function normally but had to "*lay in home in bed*" and even to "*go to the restroom was terrible*." Functional descriptions related symptoms to tasks with culturally grounded demands to impart meaning to the severity of the symptom.

Intentionality and Metacognition By design, medical records document physical information. They track disease processes (and support insurance reimbursement) rather than intentional information driving medical decisions. Narratives complement this content with information about phenomenological experiences, context and motivation that are not typically included in medical records.

In fact, practitioners asked patients to retell parts of their case history to recapture details or intentional elements contributed by the practitioner and/or patient during earlier interactions. Practitioners either asked patients to elaborate on brief descriptions from their records ("*What happened [when a particular medicine was discontinued]*?") or to recount why decisions noted in the record were made ("*I'll go check something {looks at computer} Did we stop the Ultram because it wasn't doing the trick anymore? And you liked the Tylenol?*). These questions suggest that the record noted that events occurred but not how or why. The practitioner had to solicit the patient's narrative recall to recapture significant particulars. Many of these cases involved recapturing the same kind of external and phenomenological content that seem to be a key affordance of narratives throughout the clinical encounter. Example 3 centers on this type of elaboration. This interchange was part of a long discussion of pain management. In this case the practitioner had access to a record of which medications had been given when but there was little information on why specific drugs were selected or discontinued. The example illustrates both the absence of such content in conventional medical records and the relevance of narrative content to link physical conditions, phenomenological experiences and decision processes.

Reasoning through Narrative

Narrative is a representational product, but it is also a hermeneutic process. Both the act of creating a narrative and the act of listening involve interpretation of the events depicted. Participants used the hermeneutic quality of narratives to facilitate collaborative reasoning.

At the most basic level, patients used narrative to present events of uncertain significance so that the physician could assign an appropriate interpretation. Example 2 follows this pattern. The physician asks a question. Rather than answering directly the patient describes an event of uncertain significance allowing the physician to interpret its significance.

A hermeneutic process also facilitates the hypothesis testing that is often considered a key part of diagnostic reasoning. Sometimes the practitioner would present one or more possible diagnoses during the course of the narrative and ask the patient questions to see if information either from the narrative or from past experience supported her hypothesis. In example 1, the practitioner proposes two possible diagnoses during the narrative (i.e. optic neuritis and migraines) and for each diagnosis asks the patient questions that might provide information to support her hypothesis. In cases like this one, the practitioner's questions and the patient's responses allowed them to test possible assignations of meaning to key events while co-constructing a narrative. Ideally, this led to a mutually understood and accepted interpretation of events. However, sometimes participants maintained discordant interpretations even as the narrative concluded. In example 1, the patient did not support the practitioner's hypothesis and by the end of the interaction began to object to her interpretation interjecting a 'but' into her summary.

Conclusions

The results of this study suggest that people use language to create artifacts, in this case, representations of events, that simplify cognition. These patients and practitioners faced a variety of cognitively demanding tasks that required reasoning about past events. In carrying out these tasks, they composed narratives whose composition and contents addressed a variety of cognitive challenges.

Narratives as Psycholinguistic Tools

Like physical tools, language extends our functional capacities. As tools become more complex, they facilitate the creation of more specialized tools. Thus if basic language is like an abacus, complex language is like a computer. It is a tool in itself but it also facilitates the creation of more specialized, context specific tools.

In this study, narratives served as tools to address the demands of ongoing clinical cognition. Participants constructed narratives as informational resources to represent external and/or prior events, support metacognition, coordinate care between medical practitioners, and provide detailed, functional accounts of symptom episodes. In addition, the interpretive aspects of narrative facilitated hypothesis testing and causal reasoning. This suggests physicians should view narratives not just as a socio-emotional concern but also as a cognitive resource that can be used (and recorded) more or less efficiently.

Whereas this study examined a single environment, transient, localized experience is common to many domains, suggesting that this psycholinguistic representational tool may support distributed cognition in other contexts.

Narrative Cognition

Narrative cognition has typically been discussed as divorced from other forms of cognition, especially cognition involved in problem solving, logical reasoning and hypothesis testing (Bruner, 1991). However, the narratives in this study were integrated ongoing cognitive processes including analytic reasoning. In fact, many of the properties of narrative that Bruner presented as definitional and distinct from paradigmatic reasoning served to facilitate classically defined cognitive processes, (see Table 2).

This suggests that paradigmatic and narrative cognition should not be considered dichotomous or opposing. But rather that they can, and are, productively intermingled. In

Table 2. Cognitive and Clinical Functions of Narrative Properties

Property	Description	Cognitive Functions	Use in Clinical Cognition
Narrative Diachronicity	Inherent temporality	Memory & Reasoning	Maintain understanding of case history
Genericness	Construction in relation to stylistic and plot conventions	Attention & Memory	Combination of episode based and case history narratives to recall clinically relevant information
Canonicity and Breach	Focus on a disruption in the normal flow of events	Problem Solving	Problem definition
Normativeness	Construction in relation to implicit norms	Problem solving	Problem definition
Particularity	Inclusion of highly specific details	Reasoning	Creation of functional representations & representation of relevant elements outside the clinical encounter
Intentional State Entailment	Incorporation of phenomenology and psychology of characters	Meta-cognition	Recording reasoning processes not included in official records
Hermeneutic Composability	Both creating and comprehension are interpretive activities	Hypothesis Testing	Co-construction of narratives and hypothesis testing

this study, the properties of narrative served critical functions in distributed practitioner-patient cognition by providing a vehicle for patients to create representations of key elements of the clinical problem space that would not otherwise be accessible to practitioners. In this data set, narrative was not opposed to paradigmatic reasoning but rather was a tool that facilitated clinical reasoning, including causal reasoning and hypothesis testing.

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References

Bangerter, A., & Clark, H. H. (2003). Navigating joint projects with dialogue. *Cognitive Science, 27*, 195-225;

Barthes, R., (1975). An introduction to the structural analysis of narrative. *New literary history*, 237-272.

Bloom, P., & Keil, F. C. (2001). Thinking through language. *Mind & Language, 16(4),* 351-367.

Bødker S., Anderson P.B. (2005). Complex mediation. *Human-Computer Interaction, 20*, 353–402.

Bower, G. H., Black, J. B., & Turner, T. J. (1979). Scripts in memory for text. *Cognitive Psychology, 11(2*), 177-220.

Bruner, J. (1991). The narrative construction of reality. *Critical Inquiry, 18(1)*, 1-21.

Chandrasekharan, S. & Nersessian, N.J. (2015). Building cognition: The construction of computational representations for scientific discovery. *Cognitive Science* 39, 1727-1763.

Clark, A. (2006). Language, embodiment, and the cognitive niche. *Trends in Cognitive Sciences, 10(8),* 370-374.

Cowley, S.J. (2011). Taking a language stance. *Ecological Psychology, 23*, 1–25.

Crossley, M. L. (2000). Narrative psychology, trauma and the study of self/identity. *Theory & Psychology, 10(4),* 527-546.

Dubba, K., Bhatt, M., Dylla, F., Hogg, D. C., & Cohn, A. G. (2012). Interleaved inductive-abductive reasoning for learning complex event models. In *Inductive Logic Programming* (pp. 113-129). Springer Berlin Heidelberg.

Eberhard, K. M., Spivey-Knowlton, M. J., Sedivy, J. C., & Tanenhaus, M. K. (1995). Eye movements as a window into real-time spoken language comprehension in natural contexts. *Journal of Psycholinguistic Research, 24*, 409–436.

Fulkerson, A. L., & Waxman, S. R. (2007). Words (but not tones) facilitate object categorization: Evidence from 6- and 12-month-olds. *Cognition, 105(1),* 218-228.

Haidet, P. & Paterniti, D.A. (2003). "Building" a history rather than "taking" one: A perspective on information sharing during the medical interview. *Archives of Internal Medicine, 163,* 1134-1140.

Hunter, K.M. (1991). Doctors' stories: The narrative structure of medical knowledge. Princeton, NJ: Princeton University Press.

Hutchins, E. (1995). How a cockpit remembers its speed. *Cognitive Science, 19*, 265-288.

Labov, W. (1997). Some further steps in narrative analysis. *Journal of Narrative and Life History, 7*, 395-415.

Lippa, K.D. & Shalin, V.L. (2015). Stepping up to the blackboard: Distributed cognition in doctor-patient interactions. *Proceedings of the Cognitive Science Society.*

Lippa, K.D., Feufel, M.A., Robinson, F.E. & Shalin, V.L. (submitted). Navigating the decision space: A study of medical decision making as distributed cognition

Nersessian, N.J. (2009). How do engineering scientists think? Model-based simulation in biomedical engineering research laboratories. *Topics in Cognitive Science, 1(4),* 730-757.

Ochs, E., Smith, R., & Taylor, C. (1989). Detective stories at dinnertime: Problem-solving through co-narration. *Cultural Dynamics, 2(2),* 238-257.

Pennington, N., & Hastie, R. (1992). Explaining the evidence: Tests of the Story Model for juror decision making. *Journal of personality and social psychology, 62(2),* 189.

Ricoeur, P. (1980). Narrative time. *Critical Inquiry, 7(1),* 169-190.

Robinson, J.A. & Hawpe, L. (1986). Narrative thinking as a heuristic process. In T.R. Sarbin (Ed.) Narrative Psychology: The storied nature of human conduct. (pp. 111-125). New York: Praeger.

Sluzki, C. E. (1992). Transformations: A blueprint for narrative changes in therapy. Family process, 31(3), 217-230.

Ty'len, K., Weed, E., Wallentin, M., Roepstorff, A., & Frith, C.D. (2010). *Mind & Language, 25 (1),* 3–29.

Yoshida, H., & Smith, L. B. (2005). Linguistic cues enhance the learning of perceptual cues. *Psychological Science, 16(2),* 90-95.