



# O Reexamining ORGANIZATIONAL MEMORY

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***Reconceptualizing how an interpersonal memory—particularly one including people and technology—may be defined.***

AFTER NEARLY 10 YEARS OF RESEARCH, “ORGANIZATIONAL MEMORY” (OM) HAS BECOME overworked and confused. Burdened by a practical wish to reuse organizational experience, researchers have often ignored critical functions of an organization’s memory in order to focus on only a few methods for augmenting memory. It is time for a reexamination.

**I**n this article we step back and investigate where memory exists currently within an organizational setting, rather than focusing on potential technical enhancements. In order to accomplish this we study OM within a telephone helpline that answers human-resource questions at a well-established Silicon Valley company.

We approach this problem using distributed cognition theory [4, 6] because its theoretical language spans the diverse manifestations of OM—from private to public, small scale to large scale. Our goal is to find theoretical concepts that can help us frame better designs.

We begin with a synopsis of the OM literature and the need for empirically based analyses of OM.

We next provide a description of the field site and ethnographic data collection. We then analyze a single helpline call, progressively describing the parts of the call, the surrounding work activity, and the memory used in the work activity.

THE OM LITERATURE HOLDS MANY VARYING, AND occasionally competing, definitions. Intuitively, organizations should be able to retrieve traces of their past activities, but the form of this memory is unclear in research literature. Early efforts assume one could consider memory as though it were a single, monolithic repository of some sort for the entire organization. This viewpoint proves largely untenable. However, this technical reconsideration has not been matched with a theoretical reconsideration.

Indeed, little research rests on an empirical examination of OM within a context of use, even though there have been repeated calls for these types of studies. For example, Walsh and Ungson, in their canonical article, note that: “a myriad of unexamined conjectures has defined a concept that has even served as a basis for prescriptive management advice” [11]. Indeed, Walsh and Ungson do not cite any empirical studies.

Generally, other OM theory is at a grand scale, without empirical data. For example, Huber [5] argues that organizational learning and memory support would be useful, but he does not clearly distinguish what constitutes OM. Stein and Zwass [8], while acknowledging the need for empirical studies, nonetheless rely on an organization’s high-level model.

Other studies have primarily focused on the technology systems designed to replace human and paper-based memory systems. Many of these studies examine memory systems in use, but the studies are limited to particular systems, often prototypes (for example, [1]).

This lack of empirical examinations is unfortunate. The need for systematic work in order to examine OM is pressing because as it is often conceived, OM lends itself to a number of theoretical problems. For example, organizations are hardly a single, unified entity, as the metaphor implies.

Nonetheless, we do not argue for abandoning or ignoring OM as a concept. Despite the problems, there is something compelling about the idea. As Bannon and Kuutti [3] state: “That such a concept is appealed to across a wide range of studies, even if its definition is disputed, is testimony to the fact that even if people cannot agree on what exactly the term means, there must be some set of issues ... that people feel are important and worth discussing.”

However, OM as a theoretical concept must result initially from studies within an organizational field setting, that is, within a context of everyday use. This allows the research community to reconsider how an inter-personal memory—particular one including people and technology—may be defined. With such a basis, system construction can be instituted upon empirically determined insights instead of building systems blindly. The following study is one such empirical examination.

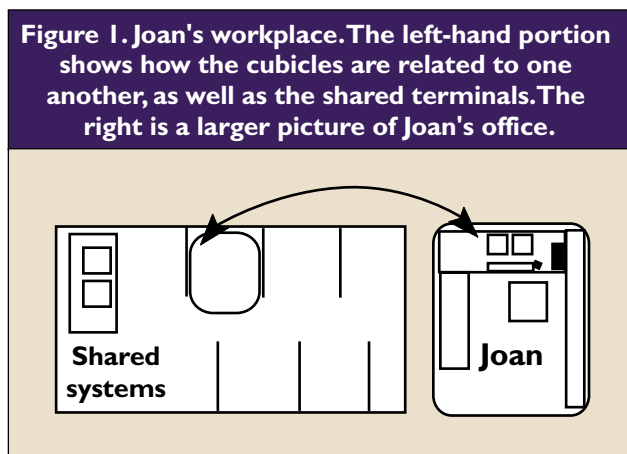
### Setting and Data Collection

We observed a telephone helpline group (HLG) at CyberCorp, a computer company headquartered in Silicon Valley. HLG answers human resource questions for CyberCorp, primarily about benefits and

personnel policies for the company’s thousands of employees.

We chose a telephone hotline because it is fast-paced and information intensive. Its many repetitive calls require routine action by the HLG agents who must begin forming their answers within 45 to 60 seconds while simultaneously listening to caller information and elaboration. The routine does mean many answers come directly from the hotline member’s memory. However, much of the repetition is in what way the types of calls are processed and in how types of information are accessed. Repetition is an advantage for analysis because of the opportunity to examine things more than once. Thus we were able to observe how the helpline agents use the resources available to them.

The field study took place over a period of 18 months. A variety of data collection methods were



used, including direct observation, video, semi-structured interviews, and social network analyses. We observed at least 300 calls, video-taped approximately 60, chose 10 for analysis in a manner similar to [4]. We describe one video-taped call here involving Joan,<sup>1</sup> an experienced agent, who has been employed by CyberCorp for five years and worked in the HLG for one year.

Joan, like the other agents, works in a cubicle that is open to a central corridor (Figure 1). Like many control room settings, the cubicles are close enough to easily hear the activities of other agents. Joan’s chair faces away from the corridor between the cubicles. This arrangement is important for accomplishing her work.

Agents use a number of software applications displayed on two monitors. One system is the CALL

<sup>1</sup>All participants and their individual attributes have been disguised for publication.

## INTUITIVELY, ORGANIZATIONS SHOULD BE ABLE TO RETRIEVE TRACES OF THEIR PAST ACTIVITIES, THE FORM OF THIS MEMORY IS UNCLEAR IN RESEARCH LITERATURE.

Tracking system (CAT) in which agents record the content of their phone interactions. The telephone to the right of Joan's monitors is another computational system that plays a role in the work. Paper resources, both public and private also surround Joan, including manuals, lists, and Post-It notes.

The following call example is necessarily simple. Space limitations prevent us from presenting a longer call, but more importantly, even simple calls turn out to be surprisingly complex and rich when fully analyzed. It is, indeed, in these simple calls that the organization and function of OM can best be mapped.

We intersperse descriptions of the call with our analysis, as is common in ethnographic description. We do not present the transcript of the call here for readability; it is available at [www.ics.uci.edu/~ackerman/om-transcript.html](http://www.ics.uci.edu/~ackerman/om-transcript.html).

### **A Mundane Task: Verifying a Database Entry**

One of the most common calls to HLG is an "employment verification." A caller (for example, a mortgage lender) wishes to determine whether a person is actually an employee of CyberCorp and calls HLG for this information. Employment verification is the simplest request HLG handles, although it can be relatively time-consuming.

In order to determine whether the person is actually an employee as well as verifying their job classification, the agent must look up the person in a database called EMPLOY, a typical corporate database containing employee records. Because of technical incompatibilities, the database must be accessed on a separate terminal. This terminal is shared by all HLG agents and is located about three meters from Joan's desk. For an employment verification, Joan must disconnect her headset from the phone, walk to this central table where two VT100-type terminals are located, access the proper one, and look up the information.

### **Determining the Answer**

The opening of this call is routine, but even so, it demonstrates critical aspects of the organization's memory. The call begins with Joan greeting the caller and acknowledging that the caller was on hold

for some period of time before the system automatically routed the call to the next available agent. Joan then acknowledges the caller's request, in this case an employment verification.

The next phase of the call is more complex, as Joan does several things simultaneously. She starts a new tracking record in the CAT system for the new call, closing out the old one she had not quite finished. She also asks for the relevant information, namely the employee's name and social security number. As she listens to the caller, she types the information into the call tracking record. When she is finished obtaining these two pieces of information, she asks the caller to wait while she looks up the information.

After a quick aside to the camera explaining her action, Joan writes onto a scrap of paper the information that she just typed. Joan then goes to the EMPLOY terminal, physically located behind her cubicle. (Part of Joan's routine is selecting the correct database because there are two different employee databases.) As she talks about the other call, she types what she has written on the paper into the EMPLOY system and pulls up the appropriate record. Joan obtains the information, double-checks it, and writes down the result.

### **A Not-So-Simple Case of Distributed Memory**

"...It is possible to identify a number of cognitive systems, some subsuming others" [6].

We pause here to point out some insights that arise from a distributed cognition analysis. Partway through the call, Joan has used both processes and artifacts that are considered memories [10]. She used a telephone system, scratch paper, and two separate software systems (CAT and EMPLOY), all of which maintain state for Joan. She does not use monolithic memory, as a strictly technocentric model would have it. Instead, she uses many small and apparently redundant memories.

Figure 2 shows the order of memory use during the process of the call. The call process is very structured, consisting largely of transferring information from memory to memory until the right pieces of information can be coordinated to answer the caller's

question. Skill is required in knowing which memories to create and trigger, but little processing is done on the actual information.

The call is initiated by the telephone system's short-term memory of the group's activity. The telephone system, showing Joan's station to be free, routes the call to her. Joan hears the caller's information, rehearses it verbally, and holds it ready using working memory while entering the information into the CAT record. (Joan's working memory bridges gaps between virtually all of the other technologies used for this call. For brevity, subsequent

tation of future use can become an issue, as we discuss later.)

In addition to maintaining group memory, the CAT program also creates transformed, longer-term memory in the form of statistics, based on the indexing done by the agent during her wrap-up period. These statistics are used by management to govern the group's future behavior, as has been typical in organizations since the late 19th century [12].

Employee verification is also embedded in a call-handling procedure, governed by the telephone system. The telephone system paces the production of the group and routes callers to group members. By doing this, it acts as a form of short-term group memory; it embeds a group memory about the form of the call-handling procedure. It is also used to create longer-term statistics, again used by the group and the larger organization.

To recap, even during the opening of the call, Joan uses

uses of Joan's working memory are omitted here and in Figure 2, but their necessity in the process is important for understanding how new technology should be designed.)

Joan then reproduces the information in CAT on paper, which is a mobile form of memory. She appears not trust to her own memory, but resorts to something reconstructible. She then types this information into the EMPLOY system. EMPLOY is a typical type of OM, a corporate database with employee records. Joan places the EMPLOY output back onto the paper. Later in the call, she will provide the information to the caller, index the call for the CAT system, and change the telephone system's state.

many discrete memories [8, 11]. The memories have *mixed provenance*: Sometimes the memory used is individual and private; sometimes it is group and public. But all of these memories must be used together seamlessly (or nearly so) to create an organizational product (the product being not only the solution to the call but all of the institutional arrangements surrounding it). The density and connectedness of memories used as resources in this environment is remarkable.

The call, of course, continues past Joan's finding the employee's record. Next Joan must provide the answer in a way that satisfies both her and the caller's organizations.

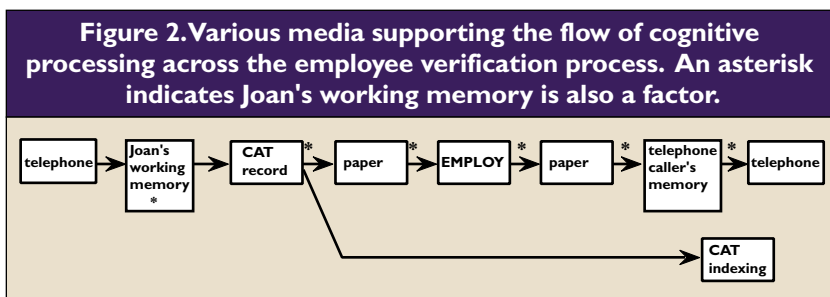
## Memories as Processes

Although Figure 2 presents the change of representational state through the various memories as one process, there are actually multiple group and organizational processes occurring simultaneously. Joan's employee verification process is *simultaneously embedded* within several other processes. Joan uses the CAT system, seemingly as a short-term memory aid. Its major use, however, is to provide other agents with the ability to reconstruct the history of a caller's problem. (Although it is unlikely to be so invoked for employment verification, this is its typical use. Since Joan knew, from her experience, that no one was likely to consult the record again, she did not provide many details about the call. But expect-

## Giving the Answer

Joan returns to her seat and goes through her standard re-opening of a conversation. She then provides the caller with the required information—the start date for the person's employment, confirming that the person is actually an employee. Joan provides the date slowly, presumably because she knows the caller is writing down her answer. The caller then requests the person's job classification. Joan normally provides this information; the caller merely asks before she can provide it. The job classification is used by some organizations to double-check the person's mortgage or credit application.

After an attempt to end the conversation, the caller prompts Joan for her name, which she provides as well as her own job classification, and the conver-



sation concludes. By Joan hanging up, she signals to the telephone system that the call is finished. The telephone system then gives her a maximum of five minutes to “wrap up.” As is usual, she goes through the indexing of the call within the CAT system.

### Memories as Boundary Objects

“The application of these abilities must be ‘organized’ in the sense that the work done by each component ability must be coordinated with that done by others” [6].

We showed how Joan’s processing was dependent on many small memories, including her own. However, solving a problem may not be dependent solely on an individual’s cognition and the artifacts (memory or otherwise) within the environment. The call also shows how Joan’s work and the work of the

which is not always up-to-date. CyberCorp’s operators, who do not need to be authoritatively correct and complete, maintain it.)

Second, Joan is providing another organization with information for its memory. The “fact” of an employee verification is now being incorporated into the outside organization’s memory, and again the memory serves as a boundary object. Contextual information is necessarily lost. The external agent relies on HLG to be correct, and the external agent is therefore relieved of any necessity of understanding CyberCorp’s internal memories. This assumes that Joan, as an organizational representative, will perform the task correctly. This is why the caller asks for Joan’s name and title to authenticate the information.

As representational state moves among individual, inter-organizational and intra-organizational bound-

## MEMORY IS BOTH AN ARTIFACT THAT HOLDS ITS STATE AND AN ARTIFACT THAT IS SIMULTANEOUSLY EMBEDDED IN MANY PROCESSES.

caller are socially organized, as well as the role of memory in that organizing.

First, Joan and HLG are dependent on another organizational group to maintain the database used to verify an employee’s benefits. Considering the call more broadly demonstrates the important set of organizing arrangements required to fully process this information. For example, there is a set of arrangements to imbue and inscribe the memory with authenticity and veracity. The HLG agent relies on the payroll group for the correctness of the information when it creates and maintains an employee record.

This employee record serves as a *boundary object* [7]. While the representation is the same, the meaning changes along with its users [4, 6]. Joan knows none of the details of the record’s creation or maintenance; almost all of the context has been lost. She does not know whether there are problems with the employee’s employment or whether there are extenuating circumstances. Indeed, she merely assumes that the EMPLOY database is “good enough” for this organizational process. (Interestingly, the EMPLOY database is midway between two other databases in its correctness. There is an authoritatively correct database maintained by the payroll group; it is used for questions regarding benefits. However, it does not provide all of the job information required by this caller. There is also an online employee phonebook,

aries, it must necessarily lose some of its context. As Star [7] points out, boundary objects in an organization work because they contain sufficient detail to be understandable by both parties. At the same time, neither party understands the full context of use by the other. This requires the information will be decontextualized as it passes the boundary. Those that need to use the memory must expect this decontextualization.

To reuse a memory, the user must then recontextualize that information. The information, if not supplied by the same individual, must be reunderstood for the user’s current purposes. Obviously reuse is possible. However, proper consideration of how a memory will be decontextualized and then recontextualized is necessary. One must consider how the information will be used, considering the present through the lens of future activity. Elsewhere we have written about the decontextualization problem with OM systems [2], but in short a difficulty, even if not outright inability in recontextualization, makes the memory useless or nearly so.

### Conclusions

We described an employee verification call, one of the simplest procedures that HLG performs. Yet, this simple procedure exposed a number of interesting aspects of OM.

This study has many limitations. As with many ethnographies, the representativeness of HLG and its activities could be argued. We have been able to present only one simple case. Yet, within these limits, we have tried to show that there is no such thing as a unified OM per se, as the metaphor attempts to invoke. We have tried to detail how a supra-individual memory works in its use of multiple people and many artifacts.

This simple call and its distributed cognition analysis exposed a number of interesting aspects of this organization's memory at a micro-level. We also showed how:

- The employment verification procedure involved nine different memories, and the human agent involved either translated among representational states or reconstructed memory states.

Even this simple procedure was a complex case of distributed memory. Memories were complexly distributed, interwoven, and occasionally overlaid. They had a mixed provenance. Sometimes they belonged to the individual (for example, Joan's scratch notes) or the group (the call-handling procedure embedded in the telephone system). But, often enough, the memory that served as individual memory also had a definition as a group and even an organization-level memory.

- While knowledge management largely restricts itself to viewing OM as repositories of experience "objects" that are magically reusable, we have tried to show that it is more fruitful to consider OM as both object and process. Memory is both an artifact that holds its state and an artifact that is simultaneously embedded in many organizational and individual processes. Furthermore, for the memory to be useful it must carry with it some marker of authenticity.

The container metaphor is easier to consider computationally, but it is extremely limited organizationally. The distributed cognition view of a network of artifacts and people, of memory, and of processing, all of which are bound by social arrangements, provides a deeper and ultimately more usable understanding of organizational life. It describes how memory as representational states can be both separated from organizational actors, and is, at the same time, necessarily bound to their actions and understandings.

- Decontextualization and recontextualization are required to effectively turn a memory "object" into a memory process. As memory crosses between groups or even across time, it becomes a boundary object, attempting to serve the needs of

both creator and reader but lacking the full context of either. To properly serve the reader or re-user of the memory, the creator must properly project the consequences of the memory's later use. This can be a difficult matter, although people do it everyday in their work.

This article has highlighted many of the issues and problems in creating memories that are used and are found usable by groups and organizations. We have also proposed a number of theoretical concepts [9] (distributed memories, simultaneous embedding of processes, mixed provenance, boundary objects, recontextualization) that enabled us to analyze the use of memory in these calls.

However, we have seen, even in this very simple example, that memories do get created and reused. More work will be required to examine the details of how work activities evolve memories. **C**

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This project has been funded, in part, by grants from National Science Foundation (IRI-9702904), QSI, and the UC MICRO program.

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