Cognitive overload, communication, and power in health care delivery

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Problem solving in the everyday world can be simulated in laboratory settings and such simulations depend for their ecological validity (Brunswik, 1957) on the way human animals behave outside of the laboratory in daily life settings.

-Paper seeks to clarify daily life decision making under uncertainty and limited capacity processing *hidden elements* of daily life decision-making:

  - multiple demands on subject’s processing resources or cognitive overload.

-Focus: decisions in medical settings.

-Two types of overload

  - normal - health care personnel attend multiple sources of information yet must compress, ignore, miss information to summarize mentally and/or in written notes (or medical history) their experiences.

  - not coping with excessive stimuli, emotional distress and possible processing errors.
Introduction

Routine physician-patient and non-professional health care staff and patient communication help us understand constraints under which decisions occur. For example,

- the physician asks questions while observing patient’s facial coloring, expressions, skin texture, and coherence of their speech.
- non-professional personnel also confronted with multiple tasks (telephone, interacting with computer, speaking with patient, other personnel, nurses and physicians).
- information processing constrained by cognitive overload - listening, observing, taking notes, writing summary reports constrain attention and memory resources.
- notes and official reports; seldom accurate re-descriptions of routine and complex daily life experiences.
Bureaucratic settings (office, meeting room, lab) as information systems

-Research analysts must learn or know technical aspects of task environment,
  -its discourse properties,
  -working knowledge of the local and larger organizational environments,
  -create meta-level representations or cultural mental models of
  -observer's actions, those observed.
-Such activities necessarily truncate depiction of data because of selective attention and memory limitations.
The Context of Work, Kirsh (2001)

- What shared information needed for successful communication? Is information in people’s heads, artifacts?

- What constitutes an activity space?

- What coordinating mechanisms (individuals, small groups) needed to synchronize activity, distribute tasks and activities, manage current resources?

- Can enough of activity context be represented so that participants recover their 'state' after interruptions?

- What perceived information resources essential for activating memory cues to allow participants to recover situated and distributed thinking?
  - For example, ad hoc categories,
  - location of things,
  - sense of control over an activity's current status.
Memory and local work conditions

Local work conditions activate two forms of long-term memory organization,

- **explicit or declarative** memory for facts,

- **implicit or non-declarative** memory for skills (Squire and Kandel, 1999: 15-17).

- explicit or declarative memory that addresses memory for facts

- Memory systems as ‘life-blood’ social interaction and discourse in workplace and research.

- Although implicit or nondeclarative memory stems from experience, for Squire and Kandel (1999: 15),
  - it ‘is expressed as a change in behavior, not as a recollection....’ and is unconscious.

- Squire and Kandel; aspects of recollective achievement in nondeclarative learning, e.g., motor skill about which something remembered,

- though performed without consciously thinking how to carry it out.
Memory and health care delivery

- Health care and administrative personnel rely on different memory systems to construct expository and narrative texts

  - **Expository;** interact with others or a computer or dictation machine.

  - **Narrative;** taking a medical history. For ex.

- linking *what brings you to the clinic this morning?* to;

- *my hands are stiff when I wake up each morning.*

- Performing an endoscopy requires extensive use of implicit, unconscious memory while using motor skills and interpreting a display of the patient’s duodenum and stomach on a TV monitor.

- Different kinds of memory activated to pose questions, comprehend patient responses, explain to patient before, during, and after procedure.
Observing and recording in natural settings

Observing variations and commonalities within and across natural settings require

- systematic observations on different days and times,
- recordings of actual work activities,
- focused, open-ended elicitation of information from subjects while they worked (cf. Altmann, 1974)
  - elicit and observe information about local and distal current and past actions.

- Practical environments help pinpoint routine and unusual (multiple) demands on work personnel.
- Are recovery devices evident after interruptions?
- Identifying emergent patterns under different obvious and subtle organizational constraints.
More on expository and narrative texts
- Expository and narrative texts signal different communicative ends.

- **Narrative text** refers to observer’s shorthand for terms associated with particular settings.

- **Narrative discourse** as more personal and spontaneous.

  - Can include socially meaningful information.
  - For example, facial expressions, prosody, gestures, body movements, and pragmatic verbal markers like ‘oh,’ ‘so,’ ‘well,’ ‘but,’ ‘and,’ ‘or,’ ‘because,’ ‘then’ ‘ya’know,’ ‘I mean,’ and ‘now’ (Schiffrin, 1993).

- **Expository speech acts** (e.g., use of polite forms of speech in bureaucratically organized health care settings.

- Technical and/or formal speech events can include gestures, ‘islands’ of casual speech acts, e.g., nurse-physician, doctor-patient talk can include both kinds of speech.
Dr.’s written progress notes

Wt: 146   B/P  112/64   Age 62

1. Widowed 9 mos. - Depressed. Saw Internist 4 mos. Ago because of vulva irritation - started 1.25 MG. Premarin -> breast soreness, so stopped EST.

2. On estrogen for 7-8 yrs. Up to 4 yrs. Ago, 1.25 MG. then 0.625 MG.

3. At Phipps’ Clinic - Mammogram - Fibrosis (1971) - reduced dose of Premarin.

4. General: (1) Large cyst L.kidney known for many years.

5. Has had 2 kidney stones - age 21 & age 59 - passed spontaneously.

6. Has “kidney infections” of 2-3 years.

7. (2) Acute glaucoma - surgery 12/75 at UCLA (R eye) - needs for both eyes.

8. 2 children (ages 27 - son, 23 - daughter in San Diego.


10. PH:  Diphtheria  age  5

11. Systems review: D arrhythmia recently - takes inderal P&N almost every night.
Comparing Dr.'s Progress Notes with interview

1. Widowed 9 mos. - Depressed. Saw Internist 4 mos. Ago because of vulva irritation - started 1.25 MG. Premarin -> breast soreness, so stopped EST.

Dr: What can I do for you?

P: Well, uh, I was concerned about, uh...last summer I guess, I-I was having a problem in the uh...uh,

guess w-what you call the bulk of the outer uh part of the organ.

There's like, paper thin uh cuts, just a little bleeding.

And finally when I went to have my checkup, which was uh...about 3 months ago, my internist asked me if I'd had a paps, test and I hadn't so he took one and he said uh my uterus was kind of spongy, and also I had uh, very low, I was very low in hormones,

And he-uh-the estrogen
Comparing Progress Notes with Interview - continued

1. Widowed 9 mos. - Depressed. Saw Internist 4 mos. Ago because of vulva irritation - started 1.25 MG. Premarin -> breast soreness, so stopped EST.

11 Dr: mh

12 P: the count was so low he said I didn't get it so he put me on uh...oh, on the estrogen pills.

13 Now about four years ago when I went through Phipps,

14 uh, they had cut me down to a half and I still was getting a lot of uh swel-swelling

15 and soreness in my breast and they took a mamograph that time and they told me to get one about every six months,

16 but, I sort of took myself off the estrogen and found that I didn't have any of that feeling,

17 so I've been off of it [...]

Comparing Dr’s Notes with Interview - continued

2. On estrogen for 7-8 yrs. Up to 4 yrs. Ago, 1.25 MG. then 0.625 MG.

3. At Phipps’ Clinic - Mammogram - Fibrosis (1971) - reduced dose of Premarin.

18 Dr: Now, 4 years ago when you were taking the
19 hormones, uh...you were going to Phipps Clinic,

20 how long did you take the hormones before-
21 I mean, had you taken them for a number /of years?
22 P: /I had been taking them. Yes, probably about...8, 7-8 years...

23 Dr: And that was the purple one?
24 P: That was the yellow one to start with, and then the purple one when they cut me down.

25 Dr: Do you know /whi-which
26 P: /So I (?) the

27 Dr: /hormone you were taking?
28 P: /yellow one, the orange , yellow one
Comparing Dr’s Notes with Interview - continued

2. On estrogen for 7-8 yrs. Up to 4 yrs. Ago, 1.25 MG. then 0.625 MG.

3. At Phipps’ Clinic - Mammogram - Fibrosis (1971) - reduced dose of Premarin.

29 Dr: Have you ever taken a different dose from that?
30 P: Well, uh, at Phipps they had uh,
31 subscribed half that dose, the little brown one
32 I believe..uh..but as I say, I, I don’t...
33 Dr: /But that still caused breast probl/ems, too, himm?
34 P: /Hmm-hm. I mean,
35 I just stopped taking them[...]
Part 2 - Stressful Overload in a Medical Specialty Clinic

Action-oriented frames of reference in the workplace
- personnel use annotative devices to minimize stress of "cognitive overload." For example:

1. **Interruptions.** Personnel cannot or only partially recover immediate prior activity.

2. Must **reconstruct progress** made in task before interruption.

3. Worker may require additional planning after interruption; memory for task or sub-task may be “erased.”

4. Consequences of interruptions depend on whether personnel can re-organize their workspace and extend memories (working, implicit, and explicit) by creating annotations or markers.

5. Annotations can enhance ability to recover local aspects of environment, including significance of artifacts needed to meet demands of task at hand.

6. Task environment a function of collaborative, distributed knowledge and skills.
A medical specialty clinic

-Clinic location; modern university hospital
-Personnel must contact central and other scheduling offices for medical specialty (endoscopies, colonoscopies, pulmonary) procedures performed.

-Pre-procedural details for appointments and special procedures. For example:
  -medical specialty coordinator instructs patients (e.g., a liquid food diet the day before, no medications with aspirin, etc.).
  -assure appropriate equipment in place (e.g., apparata for endoscopies, flexible sigmoidoscopies, colonoscopies, pulmonary procedures).

-Coordinator notifies
  -patients when physicians cancel their appointed schedules.
  -speak coherently, type expository text-like entries on computer or written forms.
  -send dictated or written summary remarks to other bureaucratic settings (e.g., clinic, insurance company), place in patient's medical chart.
Communicative demands and socially embedded cognitive overload

- Work demands create "cognitive overloading"
  - many and/or difficult demands on immediate working memory,
  - difficulty accessing semantic memories.
- Remedies for "overload" problems;
  - meetings, annotative devices (e.g., entering information on computer monitor,
    writing cryptic notes on scraps of paper, use of small, colored, paper "post-its,"
  - summarizing previous activities and plans,
  - organizing immediate workspace using prior annotative notes, or artifacts.
- Workers report cognitive/emotional sense of being "overwhelmed" or "frustrated."
- Overload reports often overlooked by researchers because
  - focus is on information processing issues and language use.
Impersonal organization or bureaucratic constraints

- Before arrival at clinic,
  - patient and office personnel have only telephone contact with central scheduling appointments office.
  - clinic personnel should have patient's medical chart available for physician.
  - time lost by patients kept waiting seldom noted.
- Cicourel (C) sat behind Coordinator Sari's workstation,
  - a corner of small area off main passageway of physicians' offices.
  - To right of C is scale for weighing patients.
  - Behind scale to C's right is storeroom for clinic and hospital gowns, other supplies.
- Sari's small corner has CRT monitor, telephone to left,
  - cabinet with documents above desk space
  - another cabinet beneath desk space to left of monitor. Writing space to right of monitor.
Typical but variable work conditions

- Work setting can appear "chaotic" at times;
  - physician and/or patient can be standing next to Sari while she is on telephone and/or checking computer screen to make or cancel appointment.
  - An important part of Sari's job; "squeezing in" patients who need immediate attention.
  - Physician's appointment schedule booked for approximately two or three months in advance.

- The following transcript captures aspects of Sari’s work on first day C began his observation and interviewing Sari about her work before physician arrived to make request. Physician begins talking without any salutation.
- To my hearing, he sounds like someone with an authoritative voice making a polite request.
Figure 1 - (13/04/2000) Exchange with physician at Sari's work station

1: Sari - Hi.
2: Dr - Uhh, I was wondering if you could
3: do an endoscopy on her today?
4: Sari - Today?
5: Dr - Yeah
6: Sari- I don't think there's any more room
7: today, cause I was doing good to get the
8: two that I got.
9: Dr - Okay. Well, just check on it (?)
10: (Sari - okay) (not clear)

-Lines 2-3 of Figure 1, physician uses discourse marker ("wondering") to ask Sari to schedule endoscopy procedure for patient standing next to physician who had come from his office a minute earlier.
Remarks about Figure 1

- "Hedge" or discourse marker "wondering" implies request by physician but
  could also imply physician perhaps realizes that finding room for patient will be difficult.
- Circumstances described by Sari appears to confirm (lines 6-8) her remark;
  finding another time slot between existing, occupied appointments will be difficult
- As Sari states: "I don't think there's any more room today, 'cause I was doing good to get the two that I got."
- "Hedge" or discourse marker "wondering" implies "request" (or insistence) by physician but could also imply physician perhaps realizes that finding room for patient will be difficult.
- Note Sari’s use of colloquial American English (“'cause I was doing good to get the two that I got”).
Observations about Sari’s work conditions

- Physician’s request in lines 2-3 and 9-10 of Figure 1 reflects
  - routine and typical interruptions Sari experiences
    - For example,
    - continuing to work on prior problem when physician approached and began speaking to her. ----She did not tell him to wait after he began speaking,
  - but he observed her actions,
  - did not continue speaking for a few moments while she finished entering information on her computer.
- The "silent" collaboration was not obvious from an examination of the discourse materials.
- Waiting for Sari to complete telephone call, physician tells patient; return in two weeks.
Further observations about Sari’s interaction with physician

In Figure 3, line 50, the physician appears to be (insisting?)

49: Dr.: (To Pat) Just hang on to it. (then to Sari)

50: We have to do it today, otherwise

51: we have to wait. Uh" (unclear") (Sari still on telephone)

-Sari still speaking on telephone, entering information on computer, does not respond.

-While on telephone and using computer, Sari appears to give physician "glances" to indicate her awareness of his concern about obtaining endoscopy that day for patient.

-Sari (voice and facial expression) seemed reluctant to cut off telephone conversation’ but she then hangs up telephome abruptly.

-I suggest (Figure 3) elements of power affected Sari's "cognitive overload," namely, work demands, Dr.’s authority, limited Sari's processing capacity.

-Sari copes by facial signals to Dr. and cutting off an incomplete telephone conversation with patient.
Sari’s relative power

-Sari provides patients with information about procedures normally transmitted by nurses.

-Sari tacitly assumes role of medical professional; her status becomes temporarily "enhanced;"

-she gives written and oral medical information to often uninformed (“anxious”) patients.

-This patient seemed confused and needed reassurance about what she should do before and after procedure.

-Temporary power Sari uses occurs despite otherwise low (non-professional) status in health care system.

-Sari's activities require delicate balance; recognizing her low status when communicating with professionals,

-being sensitive to and providing patients with medical information she is not trained to give.

-She enters data in the computer and uses stored computer information to remind her about particular patients' clinical circumstances.

-gives instructions about fasting, diet, use of enema, etc.
**Summarizing Sari’s task environment**

-Sari's annotations seek to represent state of system from when she last knew it,

-to enable her to resume questioning of patient or physician or Central Scheduling after interruptions, and return to prior state.

-Sari (or someone in comparable task environment) must create and negotiate aspects of *linguistic register* or *vernacular*. For example:

- diagnostic shorthand terms like "endoscopy," "scope," "raspy throat," "gag reflex,"

-Health care personnel in medical settings in U.S.A., like many other countries, must cope with patients from different cultures who use many different languages.

-Discourse materials presuppose but cannot always address attentional aspects of perception of local settings and their artifacts, yet these conditions

-activate participants' memories and inevitably guide speech exchanges, thus contributing to our understanding of complex local "contexts."
Concluding remarks

- Medical settings place unavoidable demands on professional and non-professional attentional and emotional resources,
- require interpersonal skills in managing such demands.
- These conditions cannot be inferred only by a reliance on recorded discourse that references identities, interpersonal relations, objects and events.
- Research analysts should engage in sufficient field research to identify organizational constraints,
  - observe actual task performance,
  - possible power relationships,
  - assess what are perceived as processing demands attributed to participants.
- We may not always have adequate data nor the time to engage in ethnographic, ecologically valid observation using different temporal samples of a given setting, but we should at least conceptualize the organizational and attentional/memory/emotional constraints even when our databases do not directly allow us to address such issues.