COGS 102A * Distributed Cognition * Dr. Christine Johnson

Lec 4: Cognitive Ethnography

Cognitive Ethnography = the primary method used to study distributed cognition
- Method derived from Anthropology – shifting emphasis of study from what, to **how** (See Williams 2006)
  - i.e. Not just which meanings, practices, artifacts define a culture, but HOW they are created, used
- Use Participant Observers, interviews, artifact description, & audio-video analyses of select interactions

- **The Three Laws** for doing Cognitive Ethnography on distributed cognition (or "How to get an A in 102B")
  1) Interaction as the unit of analysis
     - Score relations, or score elements but analyze relations
       - e.g. Not individual trajectories, but synchrony
       - e.g. Proportion of WB:CB receptor activity
  2) Multiple time scales - Micro, Macro & Historic: **Hutchins' Cube**
     - Micro=moment-to-moment; Macro=Event, task; Historic=Long-term relations, cultural traditions
  3) Configural change
     - How elements configure, and re-configure, over time (*Nothing Never Happens!)*
       - e.g. Snub: L<<C to L><C to L<<C
       - e.g. Successful problem solving often requires reconfiguring elements (e.g. Candle Problem)

- **Real-World Observation** - Two main methodological approaches: Natural History & Quasi-Experiments
  - **Natural History**
    - Systematically observe subjects functioning in real-world contexts;
      - Look for regularities, track transforms: "What information goes where when?"
  - **Quasi-Experiments**
    - As in reductionist experiments, researcher establishes initial conditions for subjects
      - BUT, subjects' response options are *not* controlled; Whatever ensues is recorded, analyzed
    - Note, unlike above, where Ecological Validity assured, here must still strive for it in experimental design
  - BOTH also often involve systematic & adaptive **Interviews** w/Subjects, for history, biases, self-report, etc.

  - **Data** = Change in an engagement *(human+human, human+artifact*) over time
    - Trust Behavior! Even the most complex, abstract, human-specific cognition WILL be evident!
      - The cognition will be observable in the patterns of transformation that occur…
    - Data collection requires repeatedly, systematically, & disinterestedly sampling the world
      - If science isn't tedious, you're not doing it right!
    - To assess information flow, ecological factors, epistemic reconfigurations, etc., need to develop . . .

  - **The Ethogram** = list of behaviors/features being scored from recordings
    - Your ethogram functions as one of the Hypotheses you are testing
      - i.e. If these behaviors/features pattern out – i.e. show invariants in their relationships - they are the **"media that matter"** - i.e. they propagate information through this system.
    - Developing precise scoring criteria requires prolonged, iterative process of test & refinement
      - Researcher must specify observation protocols in "Methods", so can be **replicated** by others

  - A context-relevant Ethogram also enables you to test specific cognitive Hypotheses
    - Such as these addressed in readings…
      - What engagements between user and tool are/not productive in this work environment?
      - How does information flow thru the cockpit in an airplane?
      - How does triadic attention develop over an infant's first year?
      - What interactions are optimal for word learning to emerge?
      - How do experts scaffold learning in novices?
      - How do interlocutors recognize & repair misunderstanding?
      - How is epistemic status negotiated in conversation? - Etc!

- **Complex Analyses**
  - Above approaches require **Multi-Modal, Multi-Party, Multi-Scalar** analyses (demanding!)
    - MULTI-MODAL: Assess changing relationship between multiple sensory & communicative modalities (e.g. speech, gesture, gaze, etc.) within each subject
    - MULTI-PARTY: Assess human+human and/or human+artifact interactions, especially the coordination of their multi-modal activity
    - MULTI-SCALAR: Assess data at multiple time scales (Hutchins' Cube): Micro particulars of macro-level task within long-term cultural setting
  - **Time** is always a critical element, since D-Cog's focus is always on **Cognitive Change**
    - Analyses typically include multi-variate analyses of multiple, coordinated time-series
    - Used to ask how does learning, conversation, collaboration, dispute, tool use etc. emerge, develop?
  - Often includes Qualitative (descriptive) as well as Quantitative (numerical) analyses
    - QUALITATIVE: Description of niche (history) based on background & Interview data
    - QUALITATIVE: Event exposition, narrative of unfolding in illustrative examples, etc.
    - Such can motivate and clarify QUANTITATIVE (statistical) analyses

- Calibrating Your Instruments
  - **Trained Observers**
    - Training and testing (Inter-Observer Reliability) of human observers requires significant up-front effort
      - Note sometimes observational protocol includes "first, spend ten years doing/watching actvity…"
    - GOODWIN (1994): "**Professional Vision**"
      - Experts develop a sensitivity to relevant details & relationships; w/effort can be described, trained
    - CICOUREL (1996, 2001, 2006): Researcher as "**Participant Observer**"
      - To understand any (esp human) activity, need experience with that activity!
      - All science necessarily done from a point of view, so **be explicit** about your **operating assumptions**
  - **Technology**
    - Videography has done for Cognitive Science what Telescope:Astronomy, Microscope:Chemistry!
      - Now we can review, analyze, the millisecond changes that our natural systems detect & use
        - BUT, what's outside the video frame? Angle of view matters! (e.g. bird's eye vs. baby's own)
      - Plus, privacy issues! e.g. Subjects need to be informed (sign waiver) - how does this impact?
    - Machine Vision, Automated Audio Analysis
      - Computers, with human training, can now score audio/video, classify behavior, find patterns, etc.
      - Can provide huge savings in observer-hours; Tech can manage massive micro-databases
    - Computational Modeling & Simulation
      - Test possible mechanisms, Demonstrate emergence; But be aware of programing assumptions!
      - Remember: Different mechanisms can produce same behavior, so simulation is NOT proof!

- Notes on the Cognitive Science of Doing Science
  - Scientific practices generate a "Cascade of Inscriptions" (Latour, 1986)
    - i.e. Science cannot proceed without **Cognitive Artifacts** (Representations, and re-representations…)
  - Science is a necessarily **cultural** process
    - Best done in teams; Conversation a valuable cognitive artifact in this process!
      - e.g. Score some data, discuss, adjust, repeat, to find boundaries "where traffic is low" (Bateson 1972)
    - Built "on the shoulders" of those who went before, uses established tools, req's exchange of info, etc
      - Science is cumulative – each study contributes its 2 cents, to eventually reveal patterns…