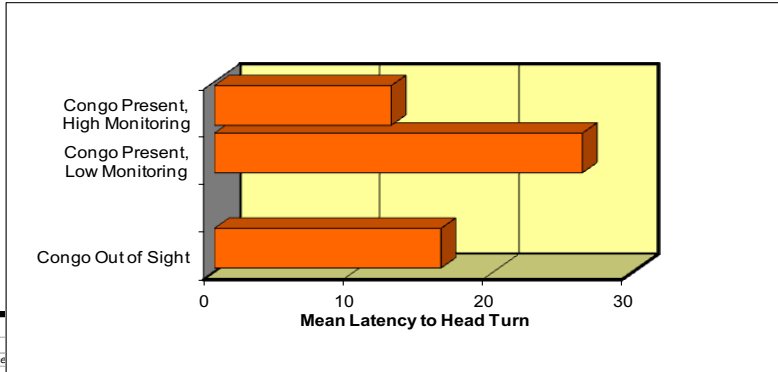
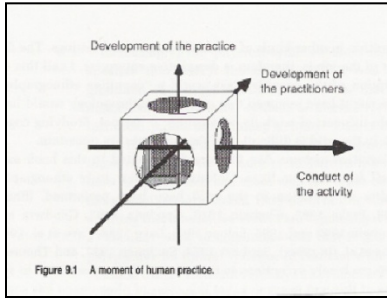







Lecture 4: Cognitive Ethnography



1 Pat: So we'll see if they have a table for five.
 2 Chil: Yeh(h)s.
 3 Helen: When? at six a clock?
 4 Pat: *mm hmm
 5 Chil: Yes.
 * * *
 6 Chil: Da dah.
 7 Pat: When we went with Mack and June.
 8 We- we sat at a table
 9 just as we came in the fr-ont door.
 10 *hh We sat with them. (.)
 11 -En then we-
 12 Chil: L^hmmmm...Nhh nh duh duh. Da duh. 
 13 Pat: So five of us can fit there.
 14 (0.2) 
 15 Pat: Six a clock. 
 16 (1.0) 
 17 Pat: Five people,
 18 Helen Sure.
 19 Pat: -Its:
 20 Julia: Seven?
 21 Pat: Seven?
 22 a' clock?
 23 (0.2) 
 24 Chil: No(h).

FIRST PASS		Status
Min	Sec	Dors/Vent
4	29	BlockedCarry Vent
"	"	CroppedCarry Dors
9	28	CroppedNoCarry
"	"	CroppedCarry VenDor
5	15	MidEventCarry DorVen
7	33	CroppedNoCarry
9	28	CaveNoData

For each line, indicate status of segment or event from following pop-up list:

CroppedNoCarry = An event, visible from the start, of any carry/active negotiation, that does NOT end in a carry.	CroppedCarry = A carry, visible from the start.
MidEventCarry = Carry w/o visible beginning	BlockedCarry = A carry that is too blocked to use as data. "Blocked" means can't see esp. heads & hands from negotiation through first few steps of carry.
None = No data	

NOTE
If you are **UNCERTAIN** about whether or not to crop, and choose **NOT** to crop, you must make a note about such **uncropped** event in the **COMMENTS** (on the line closest in time, in that same segment) explaining your uncertainty.

IMPORTANT!!!
Only enter the duration of a given segment **ONCE!**
Enter Min & Sec into separate columns for ease of tallying.
Select from pop-up list:
Vent
Enter ditto ("") if there are multiple lines (i.e. multiple events) per segment.

Carry =
Weight of both animals supported by one animal, for at least 3 steps.



Formal Criteria	For example...	Formal Criteria	For example...
Compat OwnBody	Infant: Turn to, Approach, Reach, Grp. Self/lt w/ aid. Climb on w/ aid. Dangle w/o obstructing Carry etc. Mo: Sit on, negotiate, twist, Grp. Walk w/ or w/o infant. Accommodate incl. Slow down around, Present back, etc.	Incompat OwnBody	Infant: Dead weight. Dangle that obstructs or prevents Carry. Look/ Turn/ Walk away (w/o lookbacks), etc. Mo: Dead weight. Dodge, Look/ Turn/ Walk away (w/o lookbacks), etc.
Compat OwnBody Exert	Infant: Climb on w/o aid. Pull up whole weight, etc. Mo: Extend leg. Stoop (muscle-burning 'help'), Carry dangle, Chase, etc.	Incompat OwnBody Exert	Infant: Flee. Try to escape constraint, etc. Mo: ??? (High arousal alt. like play, w/o manipulating partner?)
Compat ManipOth	Infant: ?? Weak pull? Maneuver mom's hands into carry position, etc. Mo: Maneuver infant. Lift w/ infant's aid, Low-level constraint, etc.	Incompat ManipOth Exert	Infant: Peel mom's grip, etc. Mo: Peel infant's grip. Enact alternative on infant (such as hug or contact play).
Compat ManipOth Exert	Infant: Pull w/ hunker, push mom toward carry position, etc. Mo: Helt infant w/o aid. Constrain infant who tries to escape, etc.	Incompat ManipOth Exert	Infant: ??? Mo: ??? (Hug a struggling infant? Push infant off?)
Compat Gesture	Infant: Reach & pause, Touch, Lean, Grip to assist, Gaze at, etc. Mo: Reach & pause, Touch, Toss up, Gaze at, Posture as to help, etc.	Incompat Gesture	Infant: ??? Mo: ???

Distributed Cognition

Cognitive Ethnography

- Primary method used to study Distributed Cognition
- Method derived from Anthropology
 - Shifting emphasis of study from what, to how
 - See Williams 2006 reading
- 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
- 2) Multiple time scales
 - Hutchins’ Cube: Micro, Macro & Historic
- 3) Configural change
 - Study how elements configure, and re-configure, over time
- Generate data amenable to analysis for information flow, epistemic consequences, ecological factors, etc.

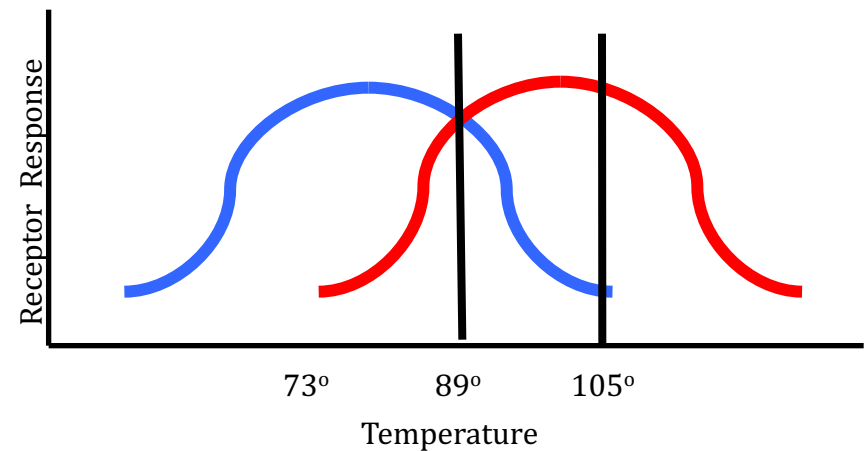


Interaction as the Unit of Analysis

- e.g. Don't analyze individual trajectories, but SYNCHRONY



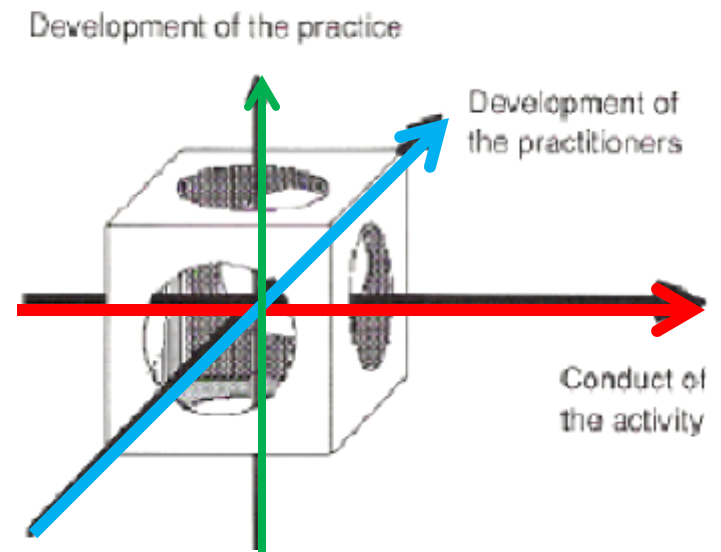
- e.g. Don't record activity of just one thermo-receptor, but proportion of activity across multiple receptors



Multiple Time Scales

• Hutchin's Cube

- Description of human cognitive activity requires...
- Conduct of the activity
 - **MICRO** scale
 - Robotics: “Social interaction is a control system that operates on the milli-second timescale”
- Development of the practitioners
 - **MACRO** scale
 - Events over the course of the interaction
- Development of the practice
 - **HISTORIC** scale
 - e.g. Cultural traditions, Institutional factors, Long-term relationships, etc.



Hutchins (1995)
Cognition in the Wild

Multiple Time Scales



MICRO

MACRO

HISTORIC

Configural Change

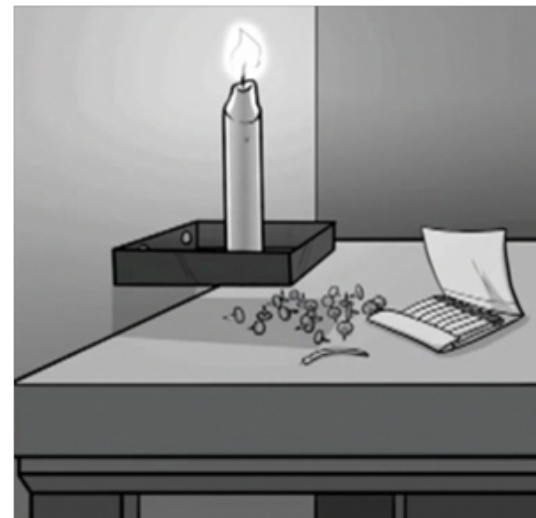
- How elements configure, and re-configure, over time
- e.g. Snub: Relative orientation changes from << to >< to <<



REMEMBER:

“Nothing Never Happens”

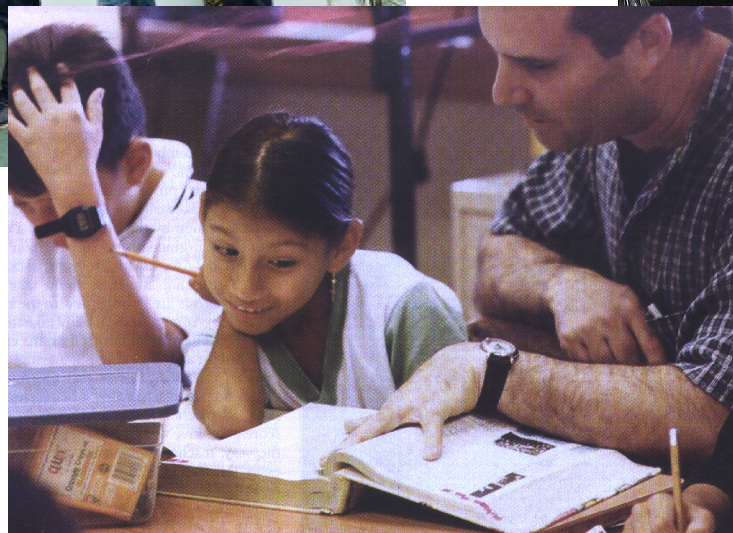
- e.g. Problem solving often requires reconfiguring elements



Real-World Observation

- **Natural History**

- Systematically observe subjects functioning in real-world
- Look for regularities, track transformations



ASK:
**“What information
goes where, when?”**

Real-World Observation

- **Quasi-Experiments**

- As in reductionist experiments, researcher sets up initial conditions for Subjects
- BUT, subjects' response options are *not* controlled
 - Whatever ensues is recorded, analyzed
- Includes debriefing **Interviews**



- NOTE: Unlike Natural History, where Ecological Validity is assured, here we must strive for it in the experimental design

Real-World Observation

- *Trust Behavior!*
 - Even the most complex, abstract, human-specific cog *WILL* be evident!



- Observable in the nature & complexity of the transformations that occur...

Real-World Observation

- Requires repeatedly, systematically & disinterestedly sample the world
 - SCIENCE: If its not tedious, you' re not doing it right!



Ecologists at work, monitoring intertidal zone by counting organisms along transects

Onset	Modalities of Attention - Record Target and Act						Other's Corridor									
	Feet		L Hand		R Hand		Body		Visual		F'sBody	F'sHead				
Frames	Trgt	Act	Trgt	Act	Trgt	Act	Trgt	Act	Trgt	Act	ID	Hcor	Bcor	Hcor	Bcor	IAD
PRE	Other	grasp	Other	grasp	Other	grasp			Obody	h&b	Z	below	front	below	front	0
3:54:17	Other	*grasp	Other	*grasp	Other	*grasp			Obody	*h&b	Z	below	front	below	front	0
3:54:20	Other	*grasp	Other	*grasp	Other	*grasp			Obody	*h&b	Z	below	front	below	front	0
3:54:22	Other	*grasp	Other	*grasp	Other	*grasp			Obody	*h&b	Z	below	front	below	front	0
3:54:26	Other	*grasp	Other	*grasp	Other	*grasp			Dpers	h&b	Z	below	front	below	front	0
3:56:01	Other	*grasp	Other	*grasp	Other	*grasp			Dpers	*h&b	Z	below	front	below	front	0
3:56:12	Other	*grasp	Other	*grasp	Other	*grasp			Dpers	*h&b	Z	below	front	below	front	0
3:56:27	Other	*grasp	Other	*grasp	Other	*grasp			Dtrav	head	Z	below	front	below	front	0
3:57:05	Other	*grasp	Other	*grasp	Other	*grasp			Dtrav	*head	Z	below	front	below	front	0
3:57:18	Other	*grasp	Other	*grasp	Other	*grasp			Dtrav	*head	Z	below	front	below	front	0
3:59:05	Other	*grasp	Other	*grasp	Other	*grasp			Dtrav	*head	Z	below	front	below	front	0
3:59:11	Other	*grasp	Other	*grasp	Other	*grasp			Dtrav	*head	Z	below	front	below	front	0
3:59:23	Other	*grasp	Other	*grasp	Other	*grasp			Dtrav	*head	Z	below	front	below	front	0
4:00:11	Other	*grasp	Other	*grasp	Other	*grasp			Dtrav	*head	Z	below	front	below	front	0

Dura 5:5Z continues to look direction traveled - R does also, but intermittantly looks up at people

IAD	OTH	Modalities of Attention - Record Target & Act											COMMENTS	
		Feet		L Hand		R Hand		Body		Visual		Act		
ID	ID	Trgt	Act	Trgt	Act	Trgt	Act	Trgt	Act	Trgt	Act	Act		
0	R											Dtrav	eyes	Use preline, or just start with * to indicate starting state?
0	R											Dtrav	head	Start with head turn even tho eyes NOT at first looking at Dtra
0	R							Dtrav	step			Dtrav	*head	When head then participates, new line??
0	R				Fbody	grasp	Dtrav	*step				Dtrav	*head	And what about "shrug" that's start of move - surely Z can fe
0	R				Fbody	*grasp	Dtrav	*step				Dtrav	*head	R's ending hug to walk changes Z's orienta - use Dpers, but n
0	R				Fbody	*grasp	Dtrav	*step				Dpers	head	R lets go of Z to scrtach her nose - irrelevant?
0	R											Dpers	*head	
0	R											Dpers	*head	If R scratching her nose is irrelevant, why not her looking bac
0	R											Dpers	*head	
0	R											Dpers	*head	Can't use Body Contact since not exclusive of other body acts
0	R											Dtrav	h&b	is h&b redundnat with Body pivot?
0	R											Dtrav	*h&b	
0	R											Dtrav	*h&b	
0	R											Dtrav	*h&b	When stop?

Bonobo Gesture Data

- Regularities confirm that the media scored were indeed relevant, and reveal organization in the interaction

Real-World Observation

- Both approaches require specifying observation protocols, so work can be **replicated** by other observers
- Precise scoring criteria requires a prolonged, iterative process of testing & refining...
 - **The Ethogram** (list of behaviors/features being scored)
 - Functions as one type of Hypothesis being tested
 - Hypoth 1: If these behaviors/features pattern out
 - i.e. show invariants in their relationships
 - Then they are the **“media that matter”**
 - i.e. they propagate information through this system.
 - e.g. What are the "semiotic resources" being negotiated during this conversation?
 - e.g. What engagements between user+tool are relevant in this work environment?

Hypothesis Testing

- A context-relevant Ethogram also enables you to test specific cognitive hypotheses

Examples from readings:

- 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!
- Lots to code,
lots to analyze



- **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

Complex Analyses

- ***TIME*** is always a critical element
 - D-Cog's focus is always **Cognitive Change**



- Analyses typically include multi-variate analyses of multiple, coordinated time-series
- Used to ask “How des learning, conversation, collaboration, dispute, tool use, etc. etc. emerge, develop?”

Qualitative & Quantitative Analyses

- Qualitative

- Descriptions of setting
- Exposition of event
- Narrative of illustrative examples
- Interview for history, experience, etc



- Such can motivate and clarify Quantitative analyses



Calibrating Your Instruments

- Trained Observers

- Training and testing (Inter-Observer Reliability) of human observers requires significant up-front effort
- Note that sometimes observational protocol can include “first, spend ten years watching the subjects, using the tech, engaging in the practice, etc...”
 - i.e. It can help if observer is expert in area being studied



Calibrating Your Instruments

Trained Observers

GOODWIN : “Professional Vision”

Goodwin, C. (1994) Professional vision. *American Anthropologist*, 96(3), 606-633.



- Experts develop a sensitivity to relevant details & relationships
- But, with effort, these skills too can be described, trained

Calibrating Your Instruments

Trained Observers

- CICOUREL (1996, 2001, 2006):

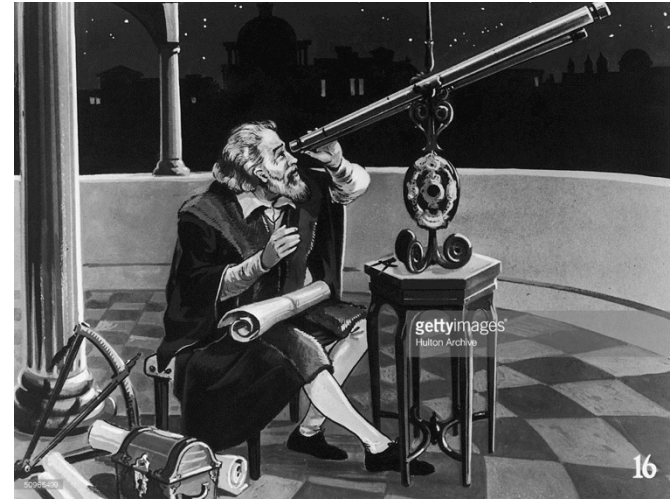
Researcher as “**Participant Observer**”



- To understand any (especially human) activity,
observer needs 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 did for Astronomy
 - ...or Microscope for Chemistry!



- Now we can review, analyze, the msec changes that our natural systems detect & use
- Privacy issues...



- e.g. In this class, subjects need to be informed (sign waiver)
- How does being filmed impact on behavior?!

Technology



- Machine Vision & Motion Capture

- Computers, with human training
- Can now score video, classify behavior etc.
- Can provide huge savings in observer-hours
- Analyses useful for massive micro-databases, probabilistic accounts

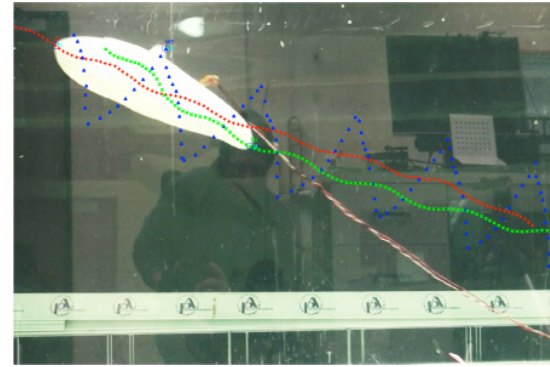


- Automated Audio Analysis

- Record sound (speech, etc)
- Can train to recognize words, etc.

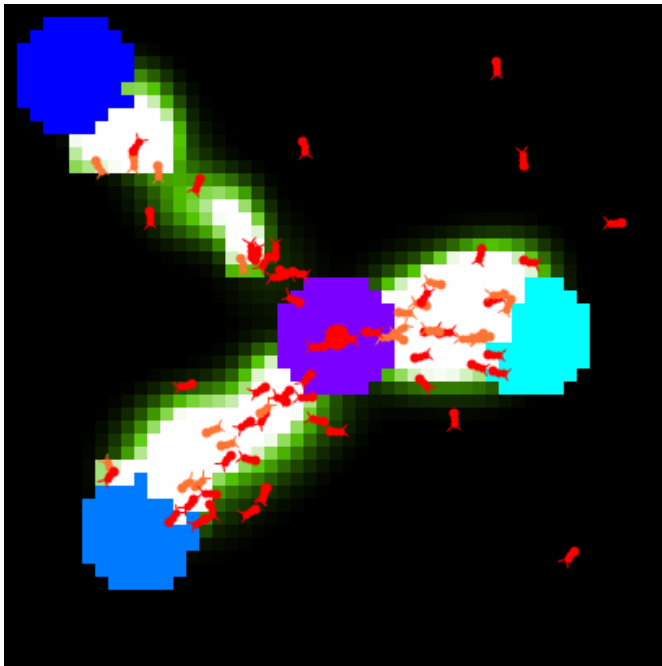


Technology



- Computational Modeling

- Simulations can test possible mechanisms, demonstrate emergence
- Can implement model, embody it in robotics



- But, beware of programming assumptions!
- Different mechanisms can produce same behavior, so simulation is NOT proof!

On the Cognitive Science of Doing Science

- Scientific practices generate a “Cascade of Inscriptions” (Latour, 1986)

Dyad State		Describe Initiation (First "To")						Occur at all?						COMMENTS	
initial	actor	Corridor	Head	Head	Body	Head	Hand	Body	Head	Hand	Body				
mom	kid	Mom's	Kid's	Mom	Kid	Mom	Kid	Mom	Kid	Mom	Kid	Mom	Kid		
mom	kid	front	front	to	to	grasp	grasp	approach	approach	up	touch	touch	lean	lean	
constrained	free	front	front	to	to	grasp	grasp	approach	approach	up	touch	touch	lean	lean	

SOURCE MATERIAL											CARRY EVENTS											Narrative of "CARRY" Event	Brief Sum of Segment	Methods Comments
#	Archive ID	Seq#	Disk#	Min	Sec	OnsetFrm	DateRev'd	DateShot	#EV/Seq	VIDQual	Context	Categ	Title	OnsetFrm	EndFrm	Continua	VIDQual	Context	Categ	Title				
1	Kes7JU05GKMJc	s1	1of2	4	02	none	12-Jan-08	7-Jul-05	OK													begins w/N nodding at Hum, K turned	Follows are a bitch!	

SOURCE MATERIAL											REVIEW INFO											DATA (Cropped Segments) ONLY											These Codes for Micro-Analyzers Only											COMMENTS
#	Archive ID	Seq#	Disk#	Min	Sec	OnsetFrm	DateRev'd	DateShot	Status	DateShot	Age	OnsetFrm	EndFrm	Continua	VIDQual	Context	Categ	Title	OnsetFrm	EndFrm	Continua	VIDQual	Context	Categ	Title	OnsetFrm	EndFrm	Continua	VIDQual	Context	Categ	Title												
1	Kes7JU05GKMJc	s1	1of2	4	29		12-Jan-08	MideventCarry		7-Jul-05	11																							Follows are a bitch!										

REVIEWER INFO											SOURCE MATERIAL											FIRST PASS											CROPPED EVENTS ONLY*											SPECIAL	EVENT TITLE	Comments
#	YourName	DateRev'd	DateShot	Archive ID	Disk#	Seq#	Min	Sec	Status	DateShot	Age	OnsetFrm	EndFrm	Continua	VIDQual	Context	Categ	Title	OnsetFrm	EndFrm	Continua	VIDQual	Context	Categ	Title	OnsetFrm	EndFrm	Continua	VIDQual	Context	Categ	Title														
1	CHSL	12-Jan-08	7-Jul-05	Kes7JU05GKMJc	s1	1of2	4	29		7-Jul-05	11																							Follows are a bitch!												

REVIEWER INFO											SOURCE MATERIAL											FIRST PASS											CROPPED EVENTS ONLY*											SPECIAL	EVENT TITLE	Comments
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1	CHSL	12-Jan-08	7-Jul-05	Kes7JU05GKMJc	s1	1of2	4	29		7-Jul-05	11																							Follows are a bitch!												

REVIEWER INFO											SOURCE MATERIAL											FIRST PASS											CROPPED EVENTS ONLY*											SPECIAL	EVENT TITLE	Comments
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1	CHSL	12-Jan-08	7-Jul-05	Kes7JU05GKMJc	s1	1of2	4	29		7-Jul-05	11																							Follows are a bitch!												

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REVIEWER INFO											SOURCE MATERIAL											FIRST PASS											CROPPED EVENTS ONLY*											SPECIAL	EVENT TITLE	Comments
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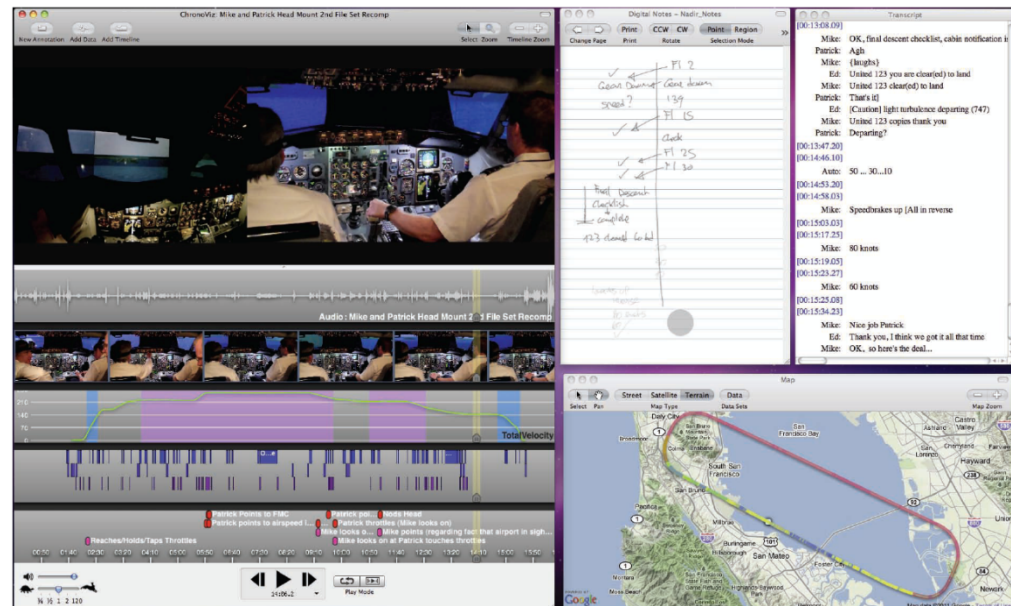
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1	CHSL	12-Jan-08	7-Jul-05	Kes7JU05GKMJc	s1	1of2	4	29		7-Jul-05	11																							Follows are a bitch!												



On the Cognitive Science of Doing Science

- Scientific practices generate a “Cascade of Inscriptions” (Latour, 1986)
- Science cannot proceed without **Cognitive Artifacts**
 - Representations, and re-representations, and re-representations...



Science is a Cultural Activity



- The “lone scientist” is a myth!!

- Science works best in TEAMS –
 - Includes division of labor
 - Conversation is a valuable tool !
- Output subject to peer review
- Disseminated at meetings & in shared journals



Science is CUMULATIVE!

- As a discourse, science is *situated*
 - In (a literature of) other work
 - Requires scholarly practices



- Even most novel question, innovative method, open exploration
> only meaningful in context of other work!



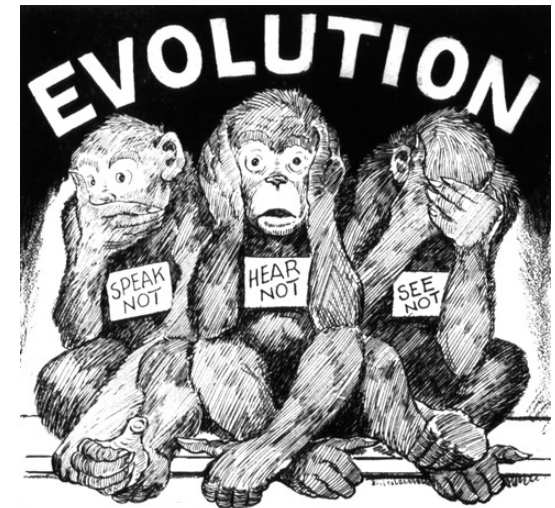
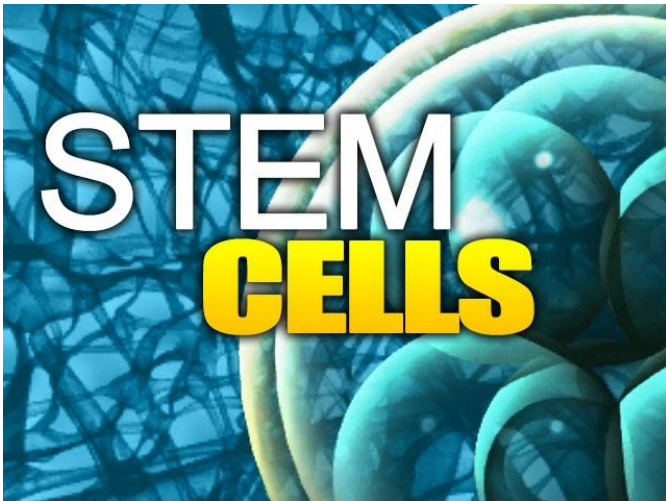
Scientists –
always on the
"shoulders of giants"

Science is CUMULATIVE!

- Plus, science is up and running . . .
 - So, it has history that has shaped where it is now
 - Political, economic, sociological factors
 - e.g. Who funded who?



The Hellman Foundation



Science is CUMULATIVE!

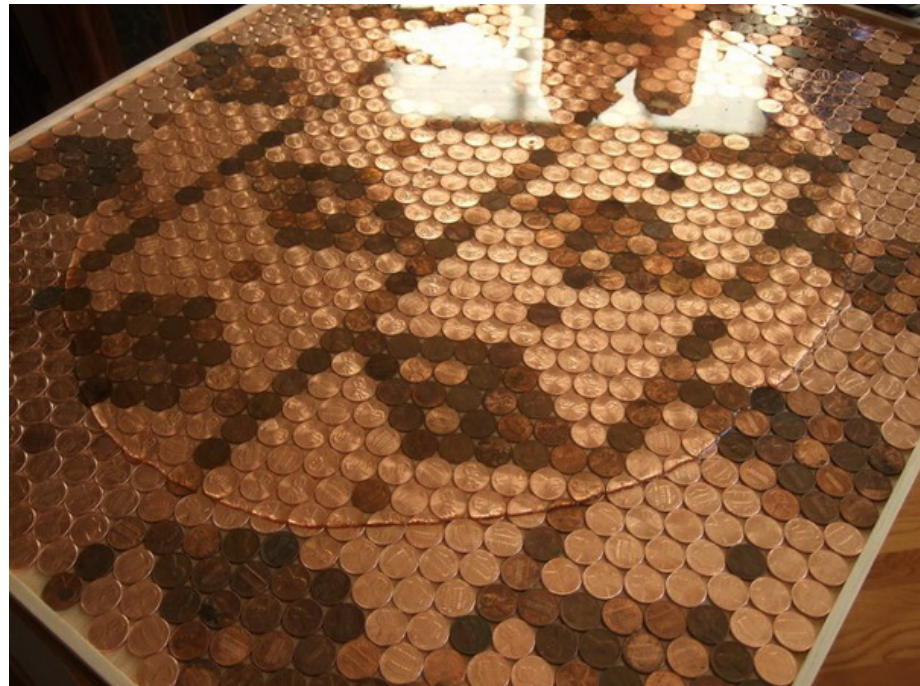
- 2 cents at a time!!
 - In studying systems, we fall prey to thinking we need to answer ALL
 - Esp since we must examine multiple parameters & their interactions
 - Even so, should pick one small question to answer



Science is CUMULATIVE!

- 2 cents at a time!!
 - In studying systems, we fall prey to thinking we need to answer ALL
 - Esp since we must examine multiple parameters & their relations
 - Even so, should pick one small question to answer

- In time, patterns will emerge...



Today's Discussion

How to Develop a Protocol

Given that you want to apply *Cognitive Ethnography*
to an issue of interest in cognitive science,
how would you begin...?