Scandinavian Reindeer Herding, Tunisian Timekeeping, and Electron Probe Microanalysis: Considering Technological Choices

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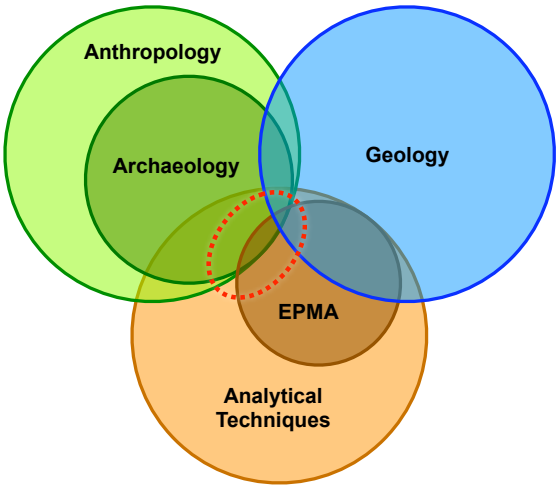
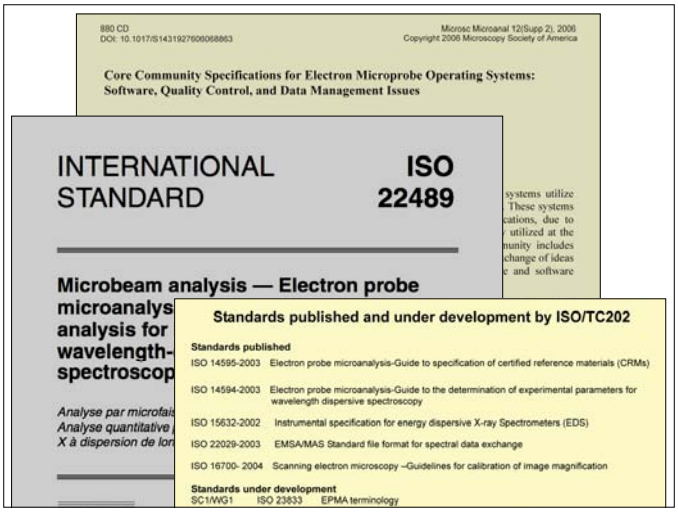


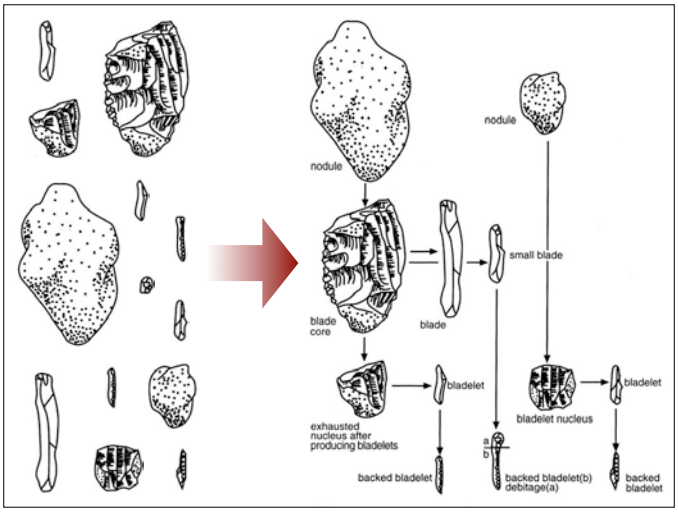


Talk Overview

- Intro to anthropology of technology
- "How does the internet affect society?"
- Society affects technology as much
  - Finnish reindeer herding, Tunisian timekeeping
- Technological choices - what? how study?
  - Operational sequences (*chaîne opératoire*)
- EPMA applications, suggestions, discussion

Why Topic?

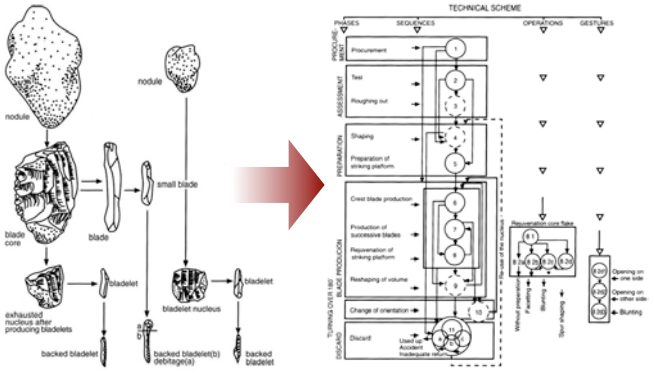
- ISO, best practices, community specs
  - Documentation, calibration, consistent procedures
  - Not debating good vs bad -- complete picture?
- Variety of "non-technical" choices
  - Individual, organizational, economic, arbitrary
- How record choices? Study?
- Why adopt/reject procedures/tech?



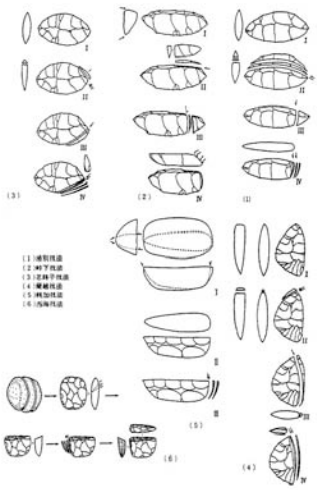
Neanderthals vs Humans

- Neanderthals' tools less advanced?
- Experiments ➙ Neanderthals tools as efficient
  - "When we think of Neanderthals, we need to stop thinking in terms of 'stupid' or 'less advanced' and more in terms of 'different'."
- Different possible solutions, choices
  - Seek differences in Neanderthal, human cultures
  - Reconstruct processes, behaviors from evidence

Converting to Processes



Japanese, American, and French schools of thought



Japanese concept: *giho*

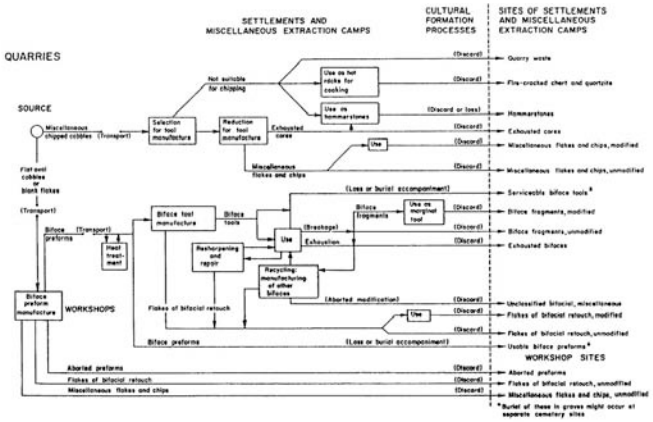
Highly patterned sequence

Structure behavior, routine

Reflects "rituals" common in Japanese culture

Aside: Would a cultural emphasis on "ritual" processes be reflected in software design or ideas about doing analyses?

American: Decision Trees



French Ethnological School

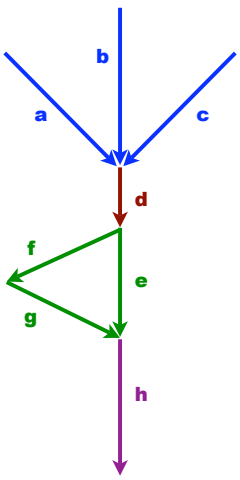
- Cognitive behavior + stone tool replication
- Cultural use, origin of technology
- Social info in how objects used
  - Dancing, cooking food, building power plants
- How technology created, used
  - Socially-mediated body techniques
- Concern for processes

Marcel Mauss

- *Les Techniques du Corps,* 1934
- Focus on physical movements, gestures
  - Integral to culture as language or religion
    - Arbitrary, culture makes efficient
    - Reflect individual/cultural "practical reason"
    - Body techniques a learned "craft"
- Energy into physical world via body

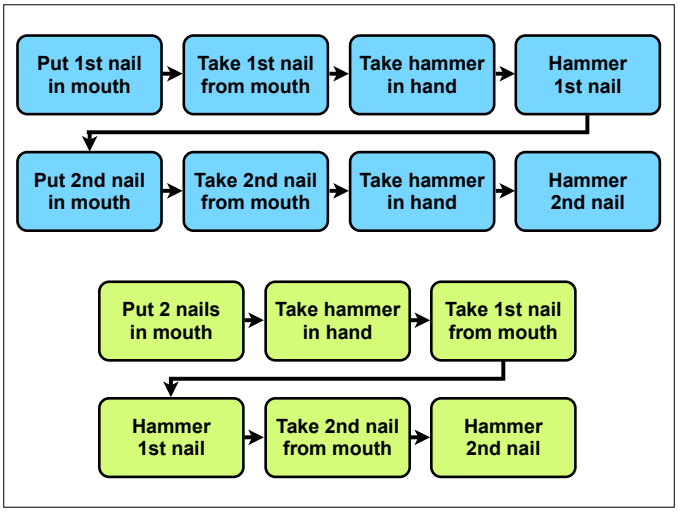
André Leroi-Gourhan

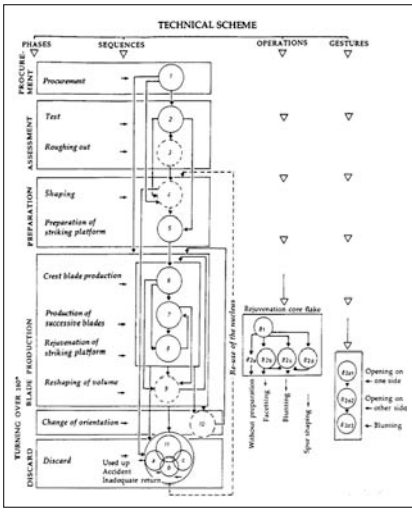
- Body a *tool*, energy applied to world
  - Scratching nose, planting potatoes, making jets
- Objects "incomplete" without actions
- "Biology of techniques" - tools like limbs
- *Enchainement* of techniques
  - Techniques: gestures/tools in syntax; sequence
  - ***Sequence***: fixed and flexible, feedback



Chaîne Opératoire

- Processes, actions from artifacts
- Pin-point cultural aspects
- Start: raw material
- End: finished product
- Middle: not necessarily linear
- Frame: Fixed/strategic tasks
- Choice: Flexible/variable tasks





Pierre Lemonnier

"... techniques can be apprehended through three orders of facts: suites of gestures and operations (technical processes), objects (means of action on matter), and specific knowledge."

Room for choice, idiosyncrasies

Pierre Lemonnier

- *Chaîne opératoire* variability; model "choices"
- Range of possibilities: forks vs chopsticks
- Technical variants reflect social phenomena
  - e.g., social control over strategic tasks
- Tech know-how + cultural practice
- When use/reject tech knowledge
  - "Unfavorable technical milieu"

Anga tech variations

House, especially walls

Types of barriers

Arrow types, barbs

Anga agriculture: same final steps, different orders

Baruya & Watchakes

Burning → Barrier → Planting

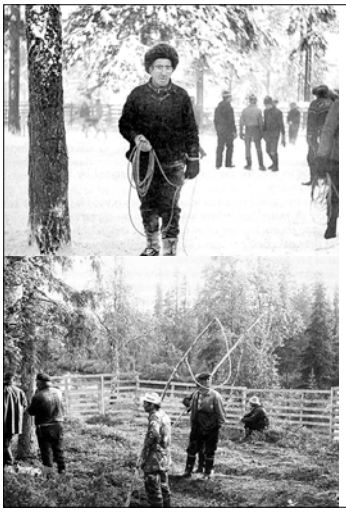
Langimar, Simbari, & Yoyue

Burning → Planting → Barrier

Menye & Kapau

Barrier → Burning → Planting

Reflects non-technical "point of view" shared by groups



Use pole-lassos in summer, not winter

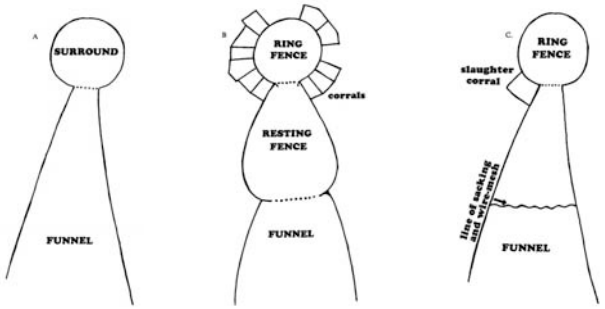
Diff explanations

Increasing use of pole-lassos

When use or not?

Choices as much social as technical

Herding Corrals



Wild Herding → Pastoralism → Commercial Ranch

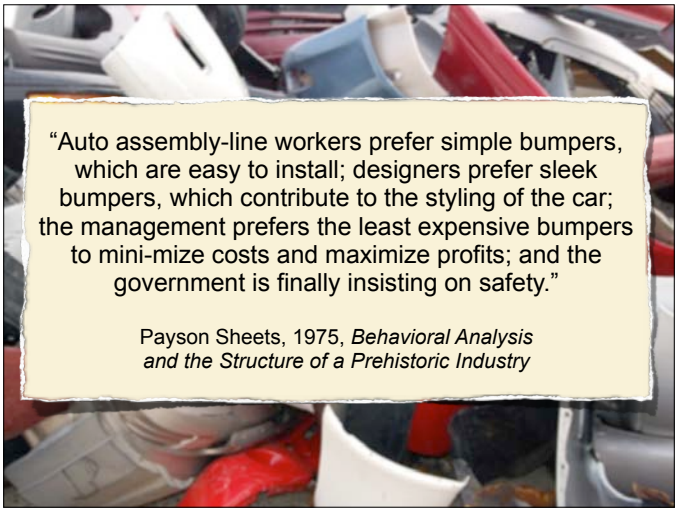
Technological changes driven by social changes

Tunisian Timekeeping

- Oasis water divided among villages, farmers
- Complex water rights, social system
  - Communal waterclock, water supervisors
- French forced division by volume, not time
  - Increased hostility among villages
  - Less effective/accommodating system
- Like Balinese water temples, irrigation

Social Shaping

- Social, economic, legal, political contexts
  - e.g., Edison's electric light vs natural gas
    - Economic, etc. calculations society-specific
  - Failure if expensive, unattractive, poor fit, etc.
- Social groups play role in technology
  - Engineers, advertisers, consumers, etc.
- Path-dependence: "locked-in" to QWERTY



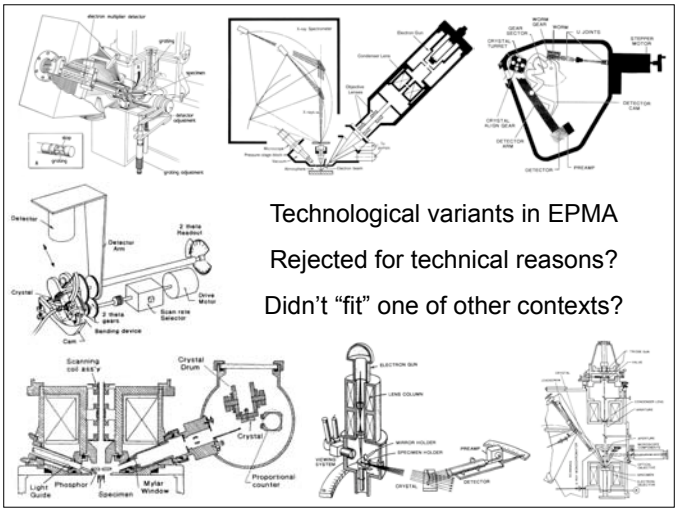
"Auto assembly-line workers prefer simple bumpers, which are easy to install; designers prefer sleek bumpers, which contribute to the styling of the car; the management prefers the least expensive bumpers to mini-mize costs and maximize profits; and the government is finally insisting on safety."

Payson Sheets, 1975, *Behavioral Analysis and the Structure of a Prehistoric Industry*

Expectations about what a microprobe "looks like"

Preconceived ideas, expectations, tendency

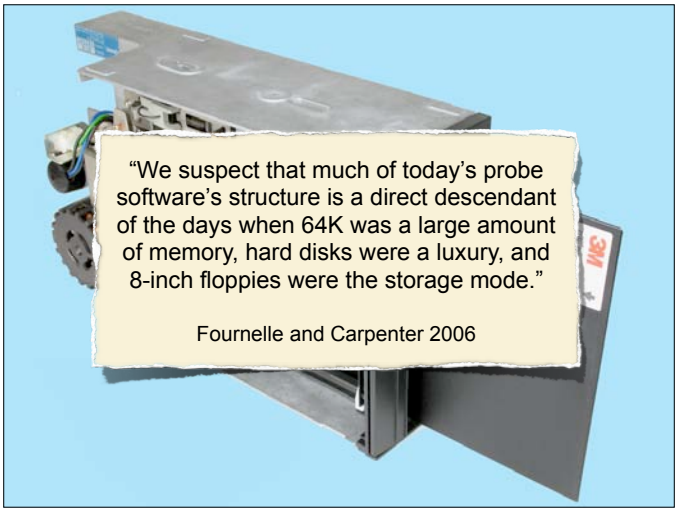
Would innovations that make a microprobe look different be accepted?



Technological variants in EPMA

Rejected for technical reasons?

Didn't "fit" one of other contexts?

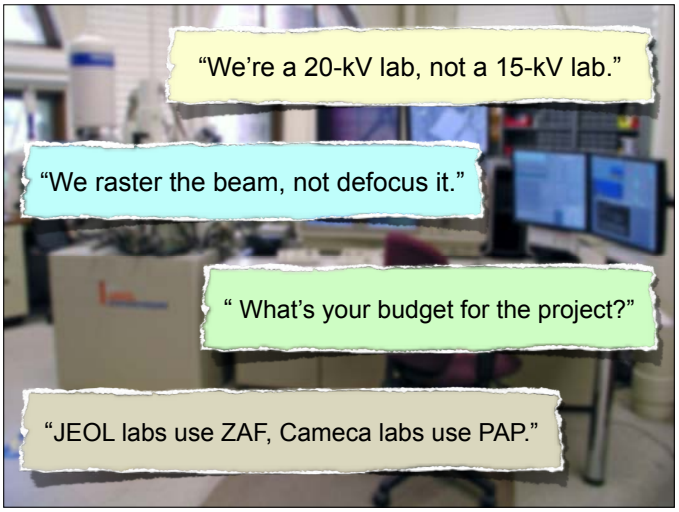


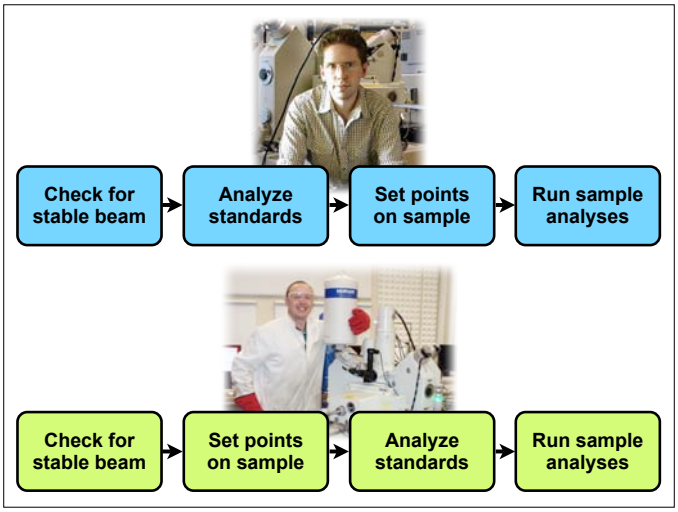
"We suspect that much of today's probe software's structure is a direct descendant of the days when 64K was a large amount of memory, hard disks were a luxury, and 8-inch floppies were the storage mode."

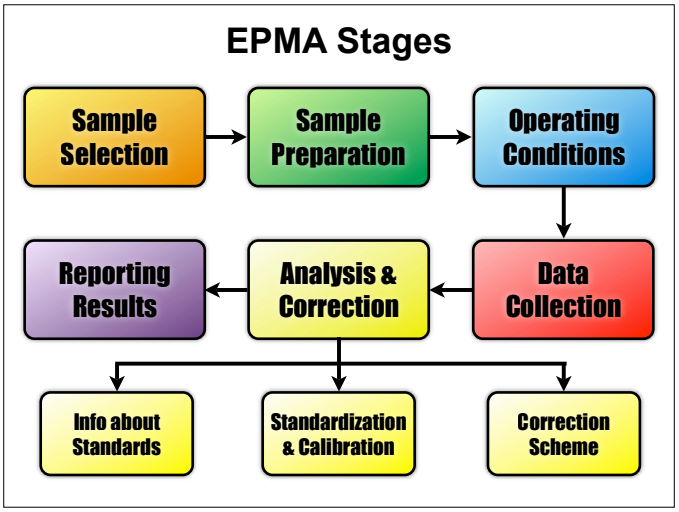
Fournelle and Carpenter 2006

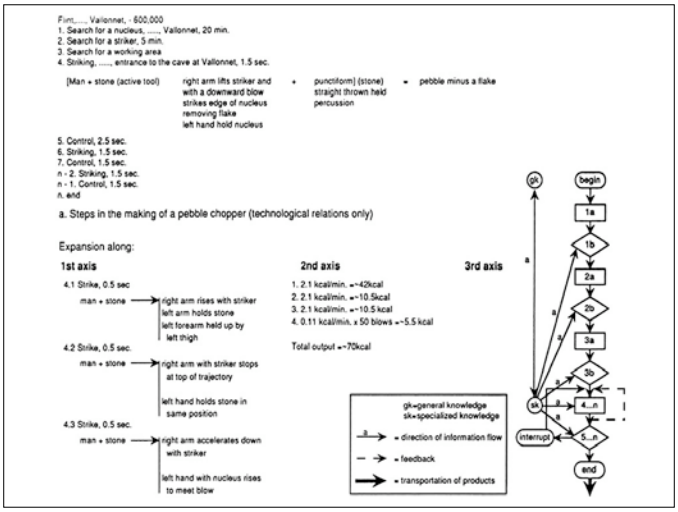
Stones to Probes

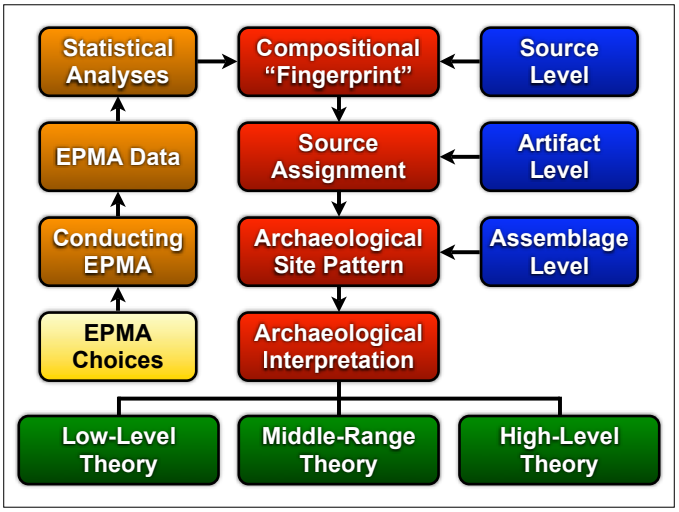
- Making stone tool, doing analysis not too different
- Material cannot be ignored, affects feedback
- Material response, feedback alters scheme
- Alter actions critically using know-how
- Consider results in light of what expected
- Assess new possibilities, adjust plans
- Undertake new actions after above











~~Conclusions~~ Suggestions

- Consider processes, arbitrariness, social factors
- Analysts start with "intentional sequence"
  - What "mental templates" do analysts have?
    - Fluid, changing ideas about template?
    - Conceptual sequence vs actual?
  - Intermediate goals affect sequence?
- Time to discuss? Ideas where choices occur?