Plans and Situated Actions
Lucy Suchman, 1987

A sociologist and ethnomethodologist

Interaction with humans & machines

Interaction requires mutual intelligibility or shared understanding

Set against cognitive science and AI

View that intelligence is symbol manipulation

The mind is computational

Mental states such as “the belief that $p$”
Why are computers ‘interactive’?

Reactive

Each user action results in a reaction

Linguistic

More than just pushing buttons, we have ‘dialogues’, ‘questions and responses’...

Should be like a conversation between people

Opacity or autonomy

Can’t see inside it, internal mechanism complex and to some degree independent of you
Activity is Based on Planning?

Mutual intelligibility means being able to recognise each other’s plans and goals
- Common conventions for expressing goals
- Shared knowledge of situations and actions

Sequences of actions toward known end
- Actions have prerequisites, effects & sub-actions
- Continually monitoring and replanning
- The plan is the intention in the mind of the user
A Problem with Planning

Plan-based approach requires a ‘script’ for every possible situation

A restaurant script, a birthday party script…
Categorise situation, apply matching script

Problem is the vast number of situations
...and the detail required to make a plan for each one

Implicit knowledge and detail is infinite
Shared culture, common sense
Doubtful that we keep it as mental states
Ethnomethodology

‘Common culture’ as a vital part of action/activity

Conscious planning is just part of activity
More efficient than endless rationalisation and abstraction away from current context

Base analysis method on *situated action*
Not just the immediate context at a given time
Person’s past experience, future expectations, control & feedback over self-image within society
Ethnomethodology: Five Principles

Plans are representations of situated actions
Such representation occurs when everyday ‘transparent’ activity breaks down
‘Objectivity’ and ‘normality’ are achieved or constructed via language
   Built up through interaction between people
   Not ‘given facts’ from nature, i.e. existing outside of language
Language is *indexical* to the situation/context
Mutual intelligibility achieved, with reference to the context’s detail: no abstract shared model
Indexicality

We have expectations of language & activity

But they have to fit with current context

Have to be related or indexed to current context: deixis

Examples: “you”, “us”, “here”, “now”, “that”, “next”, “dark”, “red”, “good”…

Instructions & procedural guidance (KARMA)

“Press the lid button, lift the lid, remove the tray”

Important references can’t all be set out in writing in advance

Need to index references, and to adapt with activity
How Much Do You Plan?

Do you measure distance as you walk along the street?
Do you consciously think in geometric terms as you move?
"Is that person 1.76 or 1.77 metres away?"

Or do you usually act *transparently*
Transparent: not ‘seeing the world through words’
You don't need to plan each step or word
You act accordingly _as_ you see person is turned away

Consider an animal in the wild
Intermediate abstract representation too inefficient
Formalised/logical representation too big/slow
Ontology

The key distinctions underlying activity & perception
- The types or phenomena that meaning is made from

Shift from objective abstract features to human activity
- We construct ‘objective’ features from our activity
- Early 1900s: Heidegger, Wittgenstein… and in Physics too
- Quantum physics and relativity put observer/interpreter at the centre of physics

Everyday ‘transparent’ activity is at the centre of meaning
- Well-designed everyday tools are ‘transparent’ or ‘ready to hand’
  - e.g. the hammer example from Heidegger
- Plans and rationalised action are exceptions to this norm
  - A means to change and adapt patterns of transparent activity?
A Language/Action Ontology

Language is action, activity and interpretation

Not just verbal activity but in all media together: symbols
- Words, tools, objects, systems, places, buildings, categories, rules...

Each person is in an endless feedback loop
- Context, activity, new context, new activity...

A symbol’s meaning is its patterns of use
- Combination, sequence and substitution along with other symbols
  As understood by an individual, based on subjective experience

The meaning of a symbol is not made up of independently objective and meaningful parts
- It’s a relative system: everything is defined w.r.t. everything else
Designing Interactive Systems

Should they be ultimately based on static procedures?
   Assume that users follow logical, planned and scripted action?
   Reducible to finite algorithmic representations
   System does as much interpretation of what to do as possible
Or should they be dynamic, contextually adaptive models?
   Finite and formal… but avoiding over-abstraction
   Plans & tools treated as resources for potential action
   Each person interprets them, mutually interprets activity of other people
   Does each tool use other tools and activity as resources for its own ongoing adaptation and activity?
Traditional Systems’ In-Built Assumptions

The system is like a script

A script is a resource to prescribe and control action
Interaction is goal-directed, planned and proceduralised
The possible goals are defined by the system’s functionality i.e. the system’s ‘interpretive activity’
The criteria of adequacy of each stage of the procedure can be specified
The Basic Procedure of Interaction

System presents instruction

User reads instruction, interprets references and action descriptions

User takes action

Design assumes that this action means that the user has understood the instruction

System presents next instruction
Breakdowns of Interaction

False alarms

User misinterprets presented information, deduces that something is wrong, then stops or thrashes
Symptom of system’s opacity, lack of good feedback, not presenting a model of activity

‘Garden path’

User is uncertain of (and can’t see) procedure, action wrong but fits with current requirements
System continues on, and error’s effect appears later… but origin/history of breakdown is no longer perceivable
‘Good’ Interactive Systems

The system is like a map

A map is a resource to describe potential action
Interaction may be more exploratory
Context and person determine goals, system’s data/functionality influence but don’t prescribe
The structure of the interaction is made up of unpredictable, dynamic events
Hard to specify what each action is, let alone whether each action is complete
The Basic Pattern of Interaction

System has affordances or potential interpretative actions
  User interprets system’s references and actions based on his/her
  experience, context, expectations

User performs an action as sensed by system
  System design assumes that a new context is then created

System presents new potential actions
  Based on past history, new context, and the algorithm to define
  future system behaviour
Making Systems More Interactive

Reactive: each user action results in a reaction

Linguistic

More than just isolated inanimate actions, we have ‘dialogues’, ‘questions and responses’…

Like people’s conversation, need continuously adapting rep^n of history, context and future

Action and representations mix/interweave media

Not just what is on the computer screen, but what is ‘out in the world’

Appropriate Opacity/Autonomy

Reveal some of internal mechanism, give an account of system behaviour that is not too complex or unfamiliar
Example: KARMA

Reactivity to variety of actions/media
  Tracked and represented in world model
  Illustration system is part of that model

Linguistic style of interaction
  Current context and future steps redisplayed
  New references & instructions to suit context
  Continually checking, adapting to errors and plan

Opacity limited: full details of plan not seen
  But could be? Show diagrams and ‘script’?
Suchman’s Conclusions

Expert tutoring/help systems
  Diagnosis based on differential modelling
  Detection of inconsistencies in interaction
  Interdependent here/now & global models
  The constructive use of trouble

Plans as resources for action
  Plans are unavoidably vague and indexical
  This can be a benefit, allowing application to a variety of contexts
Suchman and Sociology

A useful tool or partner for CompSci
Observation and understanding of ‘real world’ of people, information and interaction
...but isn’t that what we have to deal with too?
Often difficult to understand and use
  Goals, references, language not the same as ours
Often reveals inconvenient truths
  The complexity & status of our precious technology
Similarities & Differences

Differences to human behaviour
  System’s limited models of past, context, future
  System’s limited perception of everyday media
  Distance between programmer & here/now

Similarities too
  Reactivity, linguistic style, opacity

Interactive systems: one medium among others
  Understand its limits, similarities and differences
  Informed, pragmatic, contextual design decisions