

# 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<sup>n</sup> 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