

Analysis of Social Positioning in Interaction

Carnegie Mellon

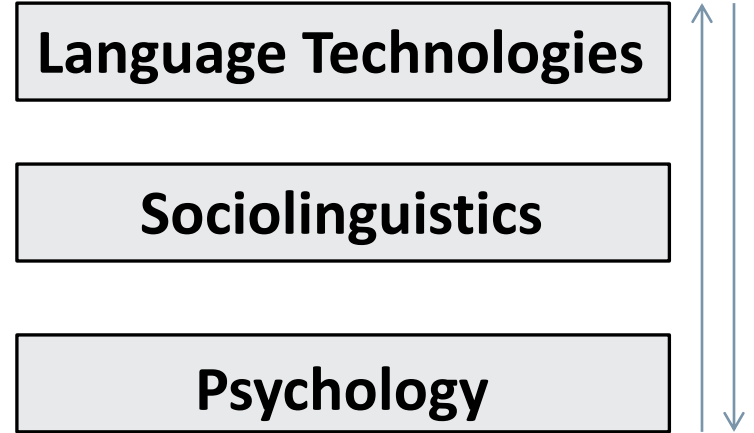
Carolyn Penstein Rosé

Outline

- Theoretical framework
 - Psychology-> Sociolinguistics -> Language Technologies
- Authoritativeness: Vertical power distance
 - Results using Integer Linear Programming
- Transactivity: Horizontal power distance
 - Results using Support Vector Machines and Dynamic Bayesian Networks
- Applications in Learning Technologies and Health Informatics

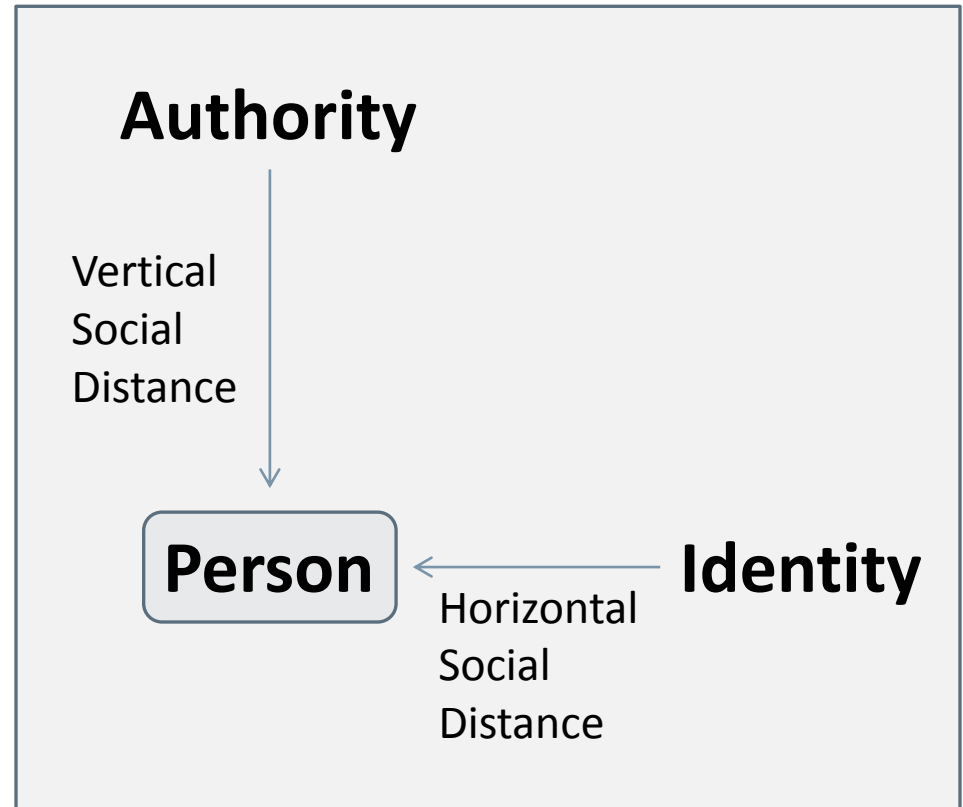
Theoretical Framework

- Basic concepts of power and social distance explain social processes operating in interactions
- Social processes are reflected through patterns of language variation
- If we understand this connection, we can model language more effectively
- Models that embody these structures will be able to predict social processes from interaction data



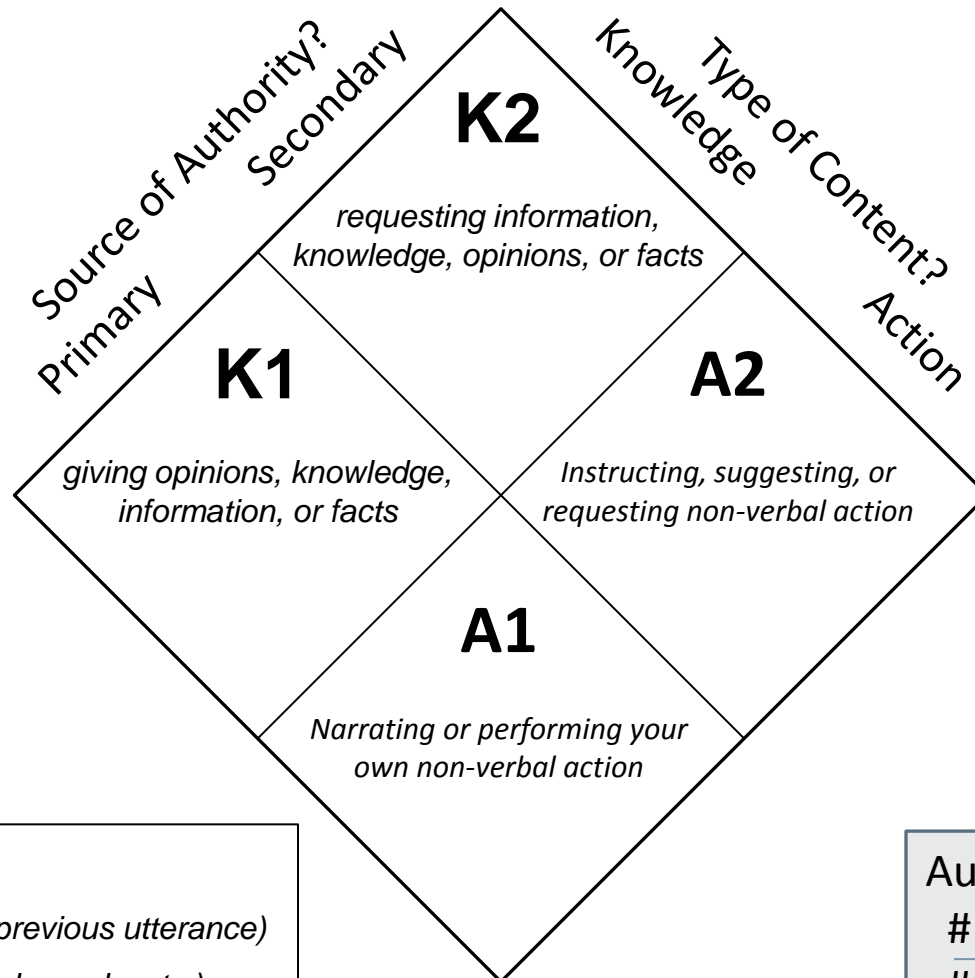
Theoretical Framework

- Some influential theories
 - Social Identity Theory (Brewer, 1997)
 - Self-Categorization Theory (Turner, 1985)
 - Social Cognitive Theory (Bandura, 1986)
- We gain influence in interaction through manipulation of horizontal and vertical social distance
- We manipulate distance through signaling



Analysis of Vertical Power Distance

The Negotiation Framework



Additionally...

ch *(direct challenge to previous utterance)*

o *(all other moves, backchannels, etc.)*

Authoritativeness:

Source Core Moves

Core Moves

Constraints for Integer Linear Programming...

(Martin and Rose, 2003)

1. You don't request information or action after it's been given.
2. Knowledge and action don't mix.
3. You don't respond to the same request twice.
4. You don't respond to your own requests.

Machine Learning for Negotiation

Data: 20 hand-coded conversations (4374 turns)

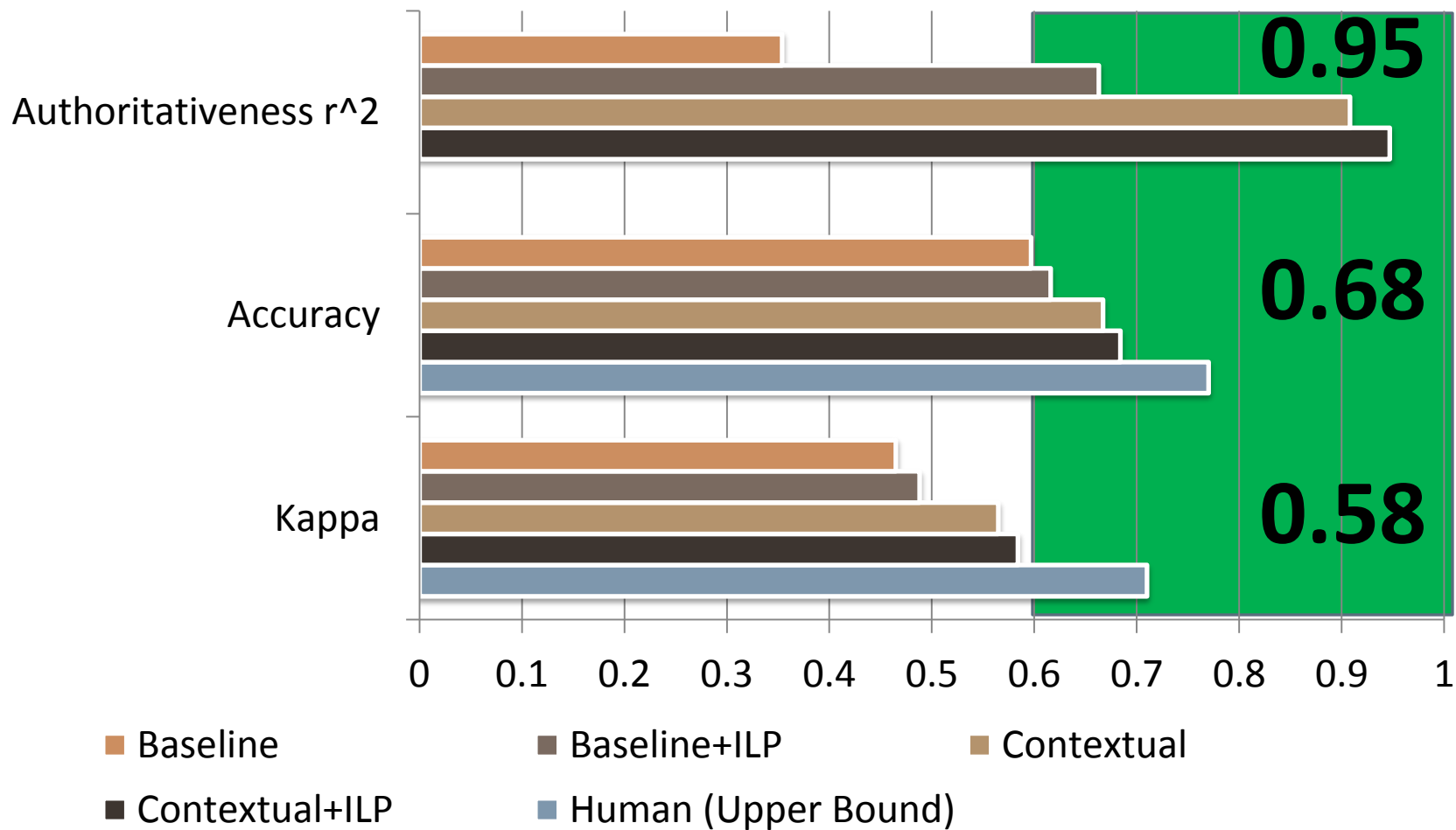
Results given are from 20-fold leave-one-conversation-out cross validation

All improvements between models are significant ($p < .01$)

Tools used:

- SIDE (Mayfield and Rosé, 2010) for feature extraction
- SVM^{light} (Joachims, 1999) for machine learning
- Learning-Based Java (Rizzolo and Roth, 2010) for ILP inference

Results



Is Authority useful? Yes!

(joint work with Iris Howley, CSCL 2011)

In a group learning context, more Authoritative students showed higher learning gains.

In pairs, ratio between students' Authoritativeness ratios predicted group self-efficacy.

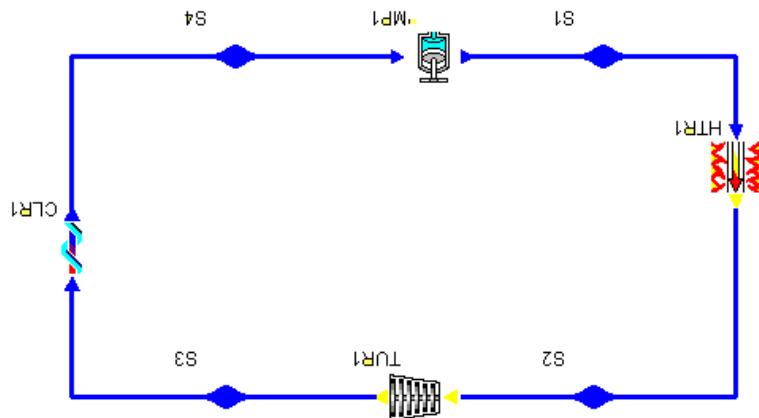
More authoritative students also showed more warning signs of aggressive (“bullying”) behavior.

In MapTask data, groups with more authoritative instruction givers produce more errors.

Analysis of Horizontal Social Distance

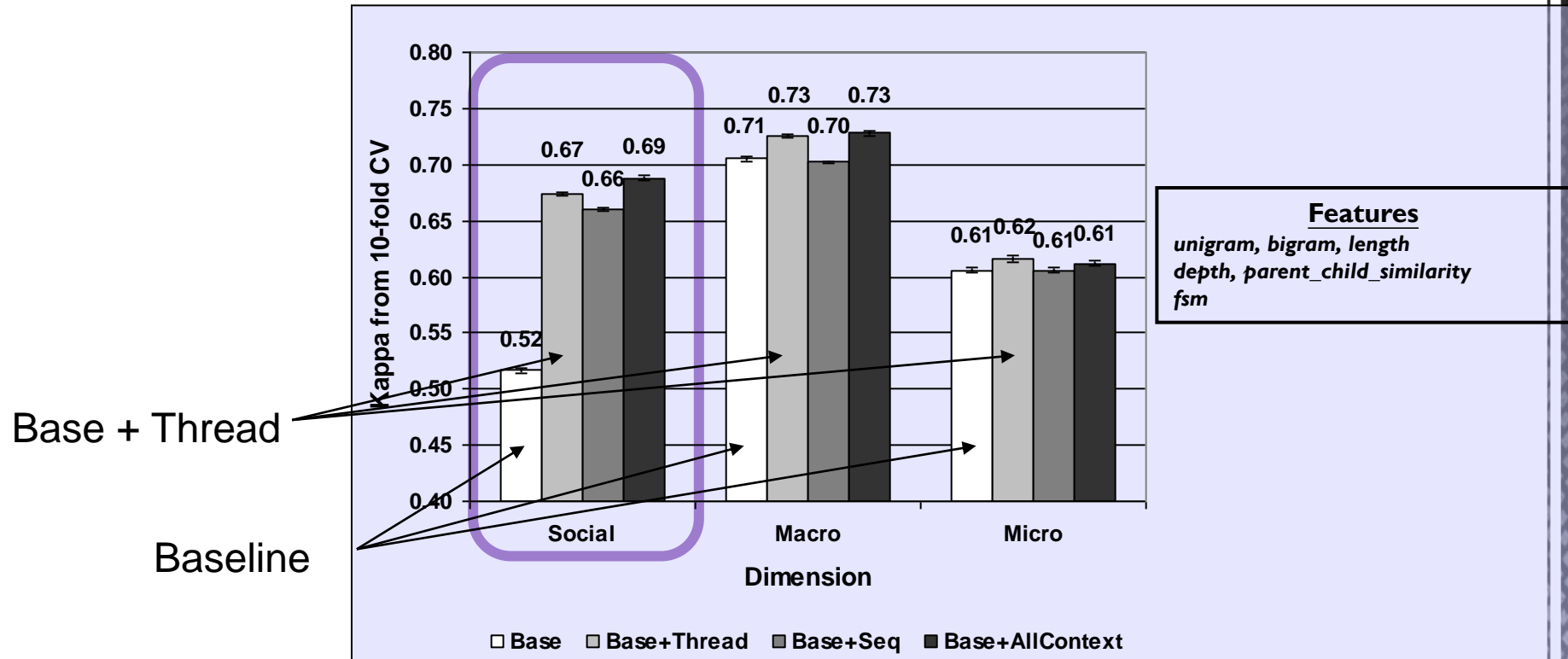
Transactivity (Berkowitz & Gibbs)

- Explicitly display reasoning
- Orient contributions towards previous contributions



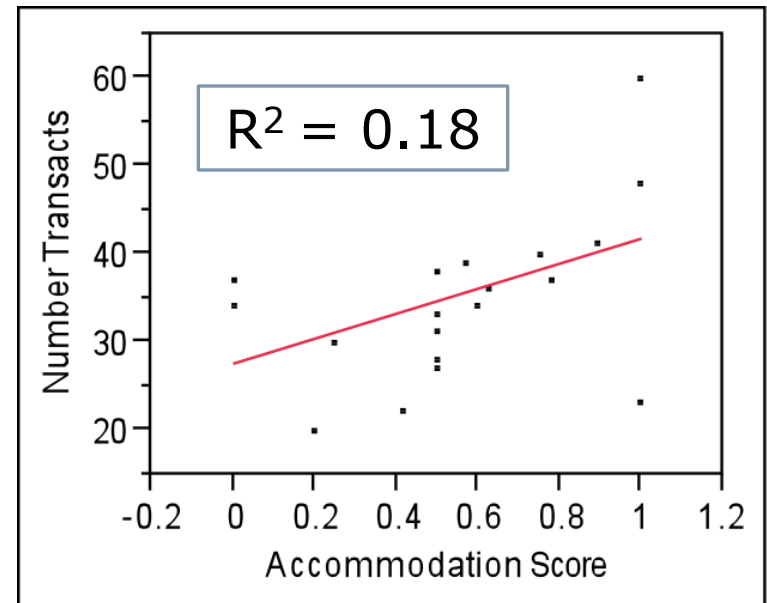
- **[Student1]** Well.... U do know that increasing t_{max} and p_{max} means more Q_{in}
- **[Student2]** yeah, that makes an argument for not using that idea in our design – but on the other side, it leads to more quality – which means you get more work out of the turbine

Evaluating Context-Based Features



Recent work in speech

- Modeling speech style accommodation using dynamic Bayesian networks (Jain et al., submitted)
 - Leveraging the idea that social processes are continuous rather than instantaneous
- Correlating speech style accommodation with transactivity (Gweon et al., submitted)



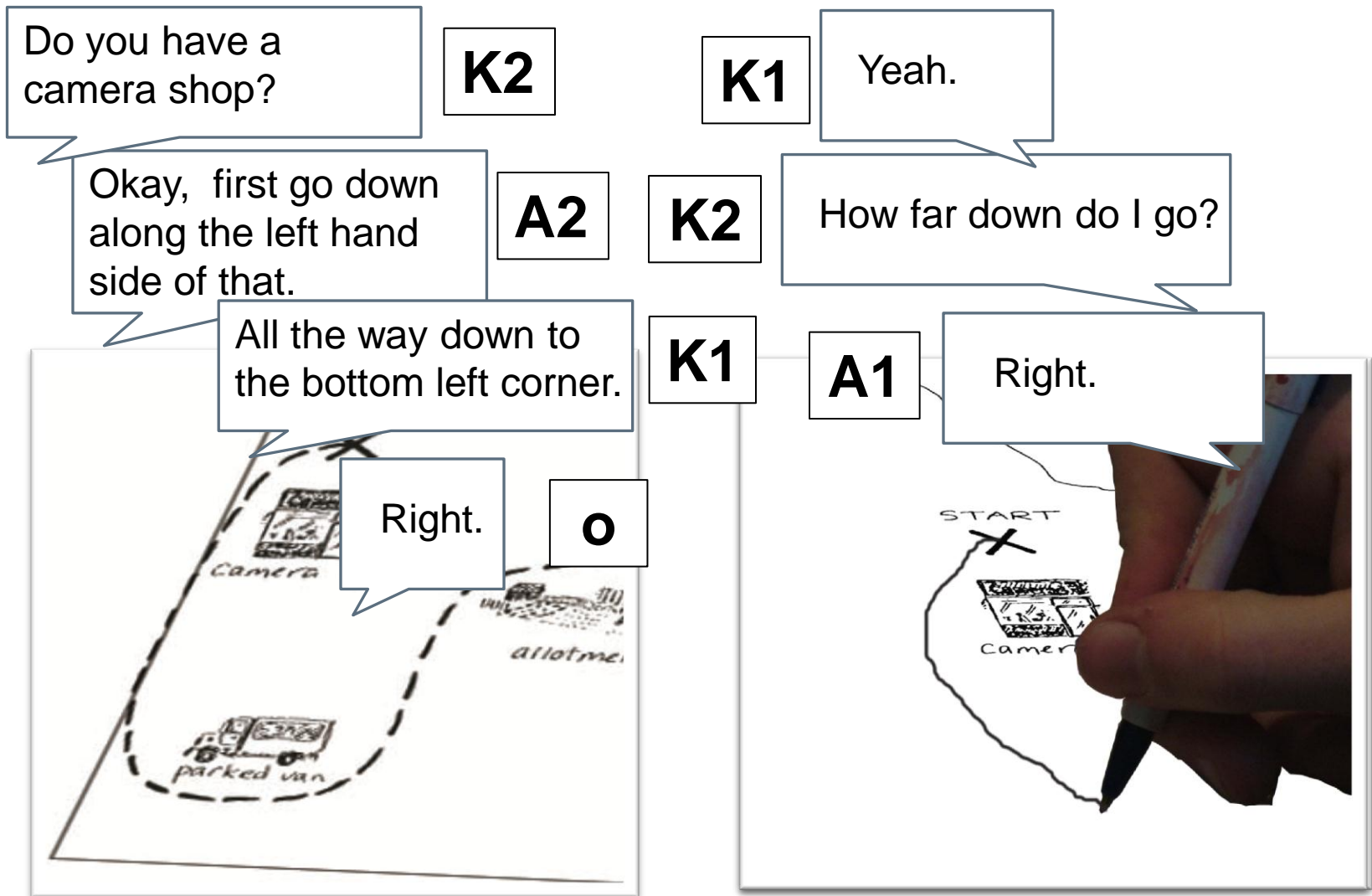
Applications

- Both transactivity and authoritativeness correlate with learning
 - Applications in online assessment of group learning
 - Triggering context sensitive support for group learning
- Recent demonstration of generalization to doctor-patient interactions
 - Authoritativeness predicts some important patient perception metrics
 - Automatic analysis may support doctor professional development

Thank You!

Questions?

The Negotiation Framework by Example



The Negotiation Framework by Example

Now go up to the left
of the youth hostel.

A2

K2

Where's that?

Right above the
alpine garden.

K1

ch

I don't have that.

