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# A process perspective on the multiple dimensions of negotiations

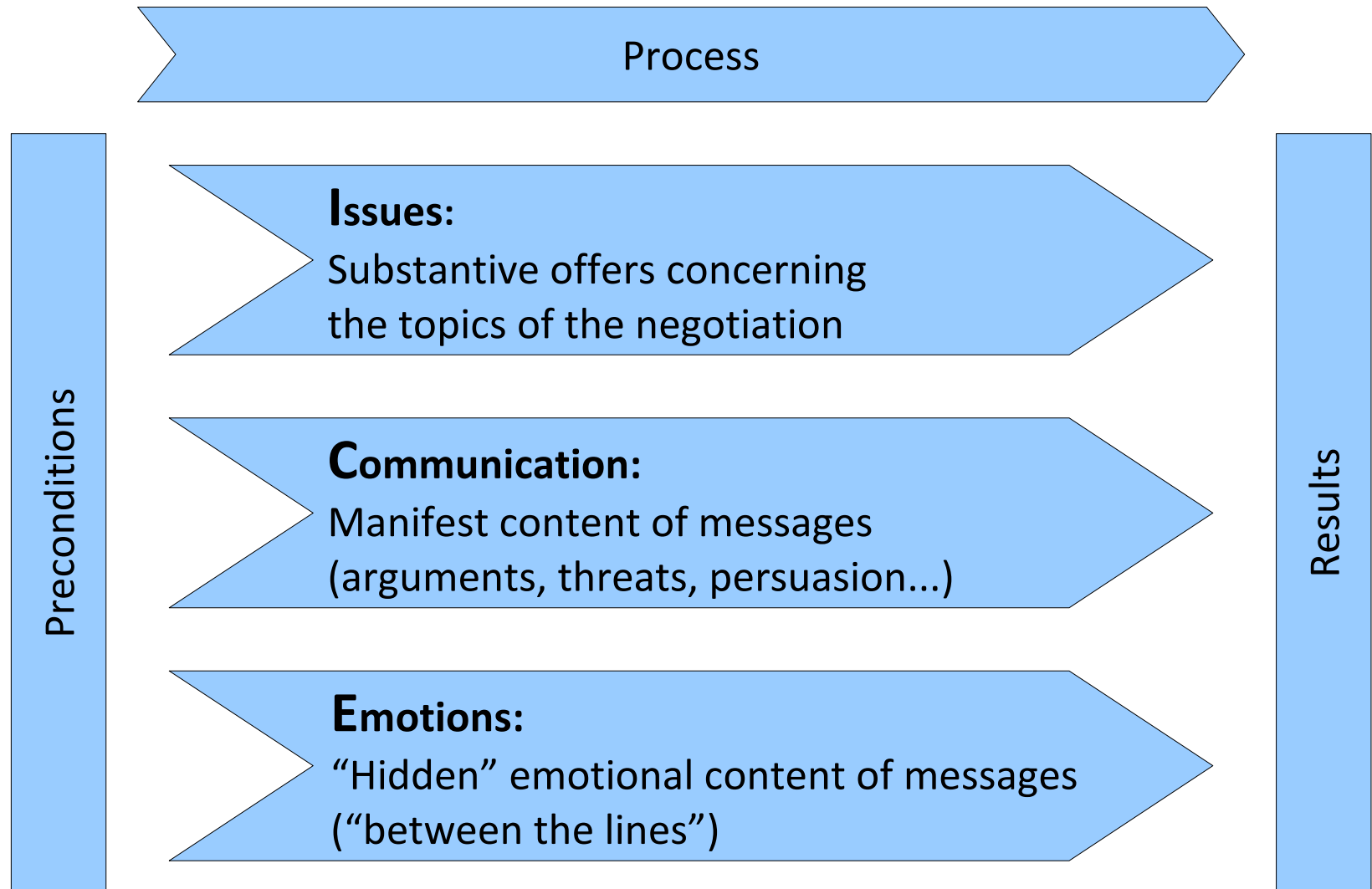
Rudolf Vetschera  
University of Vienna

Workshop Decision Making  
Toulouse, April 25, 2017



- Dimensions of the negotiation process
- A process perspective: Levels of granularity
- Measurement of dimensions
- Interactions between dimensions: Some empirical results
- Summary and conclusions

# Dimensions of negotiation processes: The ICE framework



## Substantive:

- Theoretical dynamic bargaining models (Rubinstein, Zeuthen/Hicks)
  - Abstract, game-theoretic models
  - Little empirical evidence, mostly in highly abstract experiments
- Empirical research on concessions
  - Richer settings
  - But only either total concessions or particular steps (e.g., first concessions)
- More recently: Concession patterns for automatic negotiation agents
  - Prescriptive models
  - Often based on time
  - Evidence mostly from tournaments between agents



## Communication:

- Phase models:
  - Theoretical foundation
  - Empirically verified
  - Many different, but similar schemes
  - Broad structure (3-4 phases)
- Classification schemes (content analysis)
  - Good understanding and classification of contents
  - Only phase level
- Only few models at more detailed level
  - Reciprocity
  - Turns, critical events

# Dimensions: State of Research

## Emotions:

- Only a recent topic
- Difficulties in measuring/classifying emotions
- Mostly static (entire negotiations)

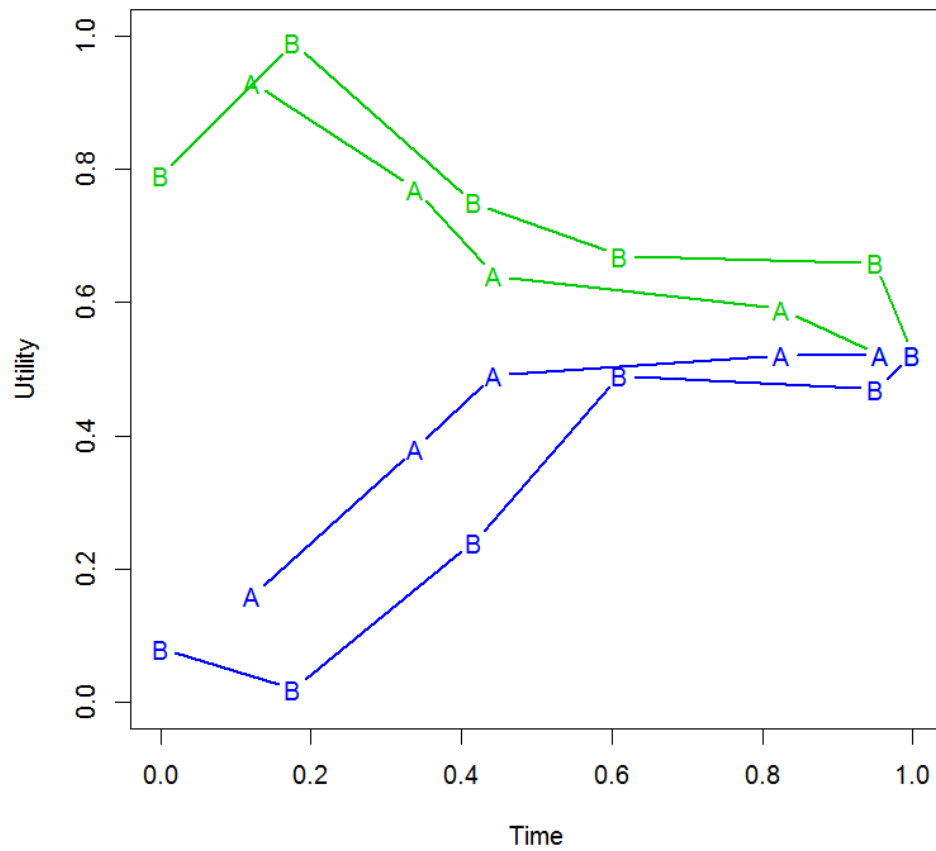


- Model should be **flexible** to accommodate
  - different processes
  - different goals of analysis
- Processes should be made **comparable**
  - for aggregation
  - and statistical analysis

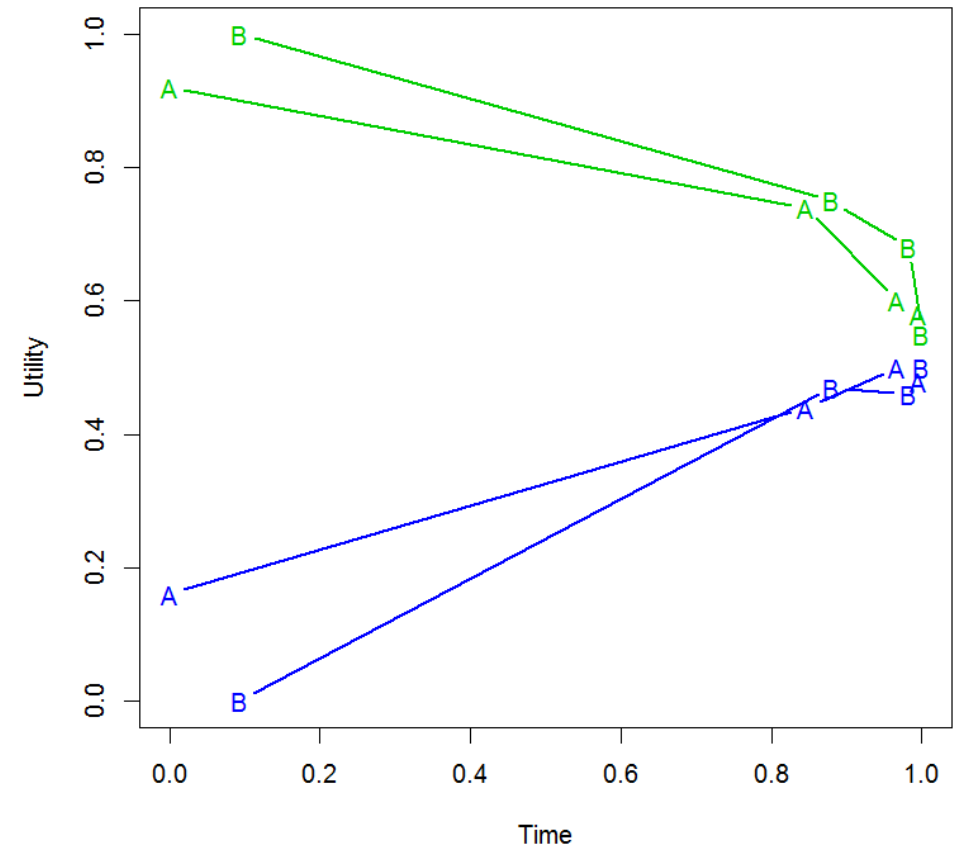
# Need for flexibility



Experiment nr 13

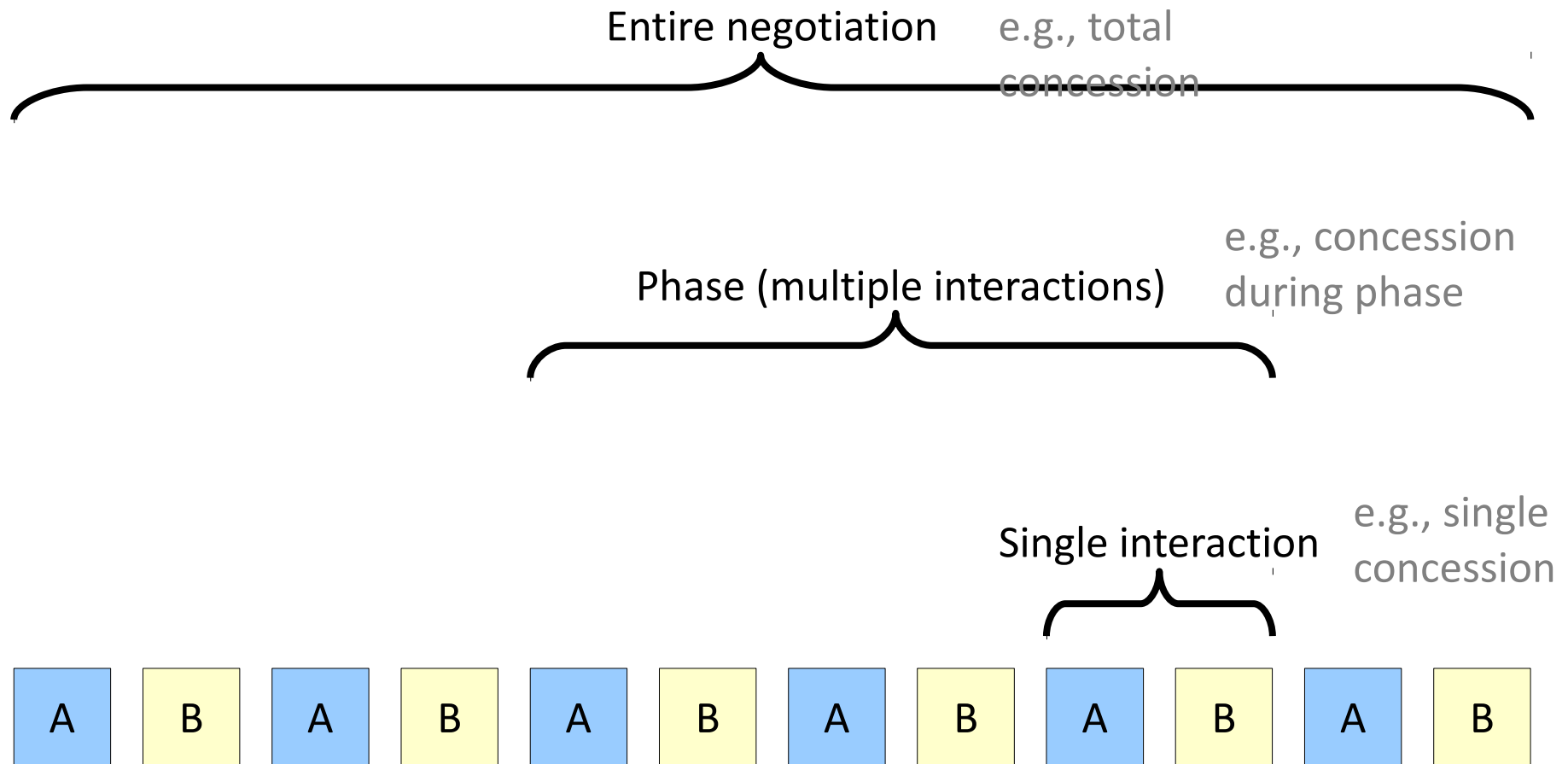


Experiment nr 14





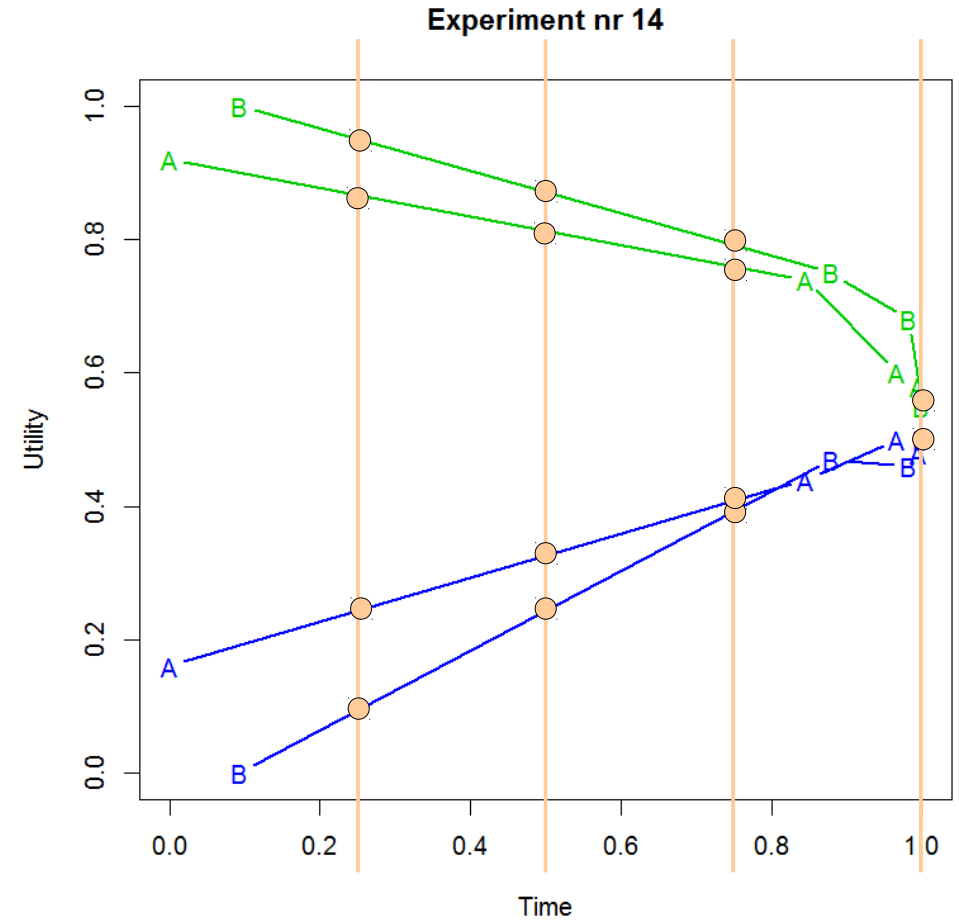
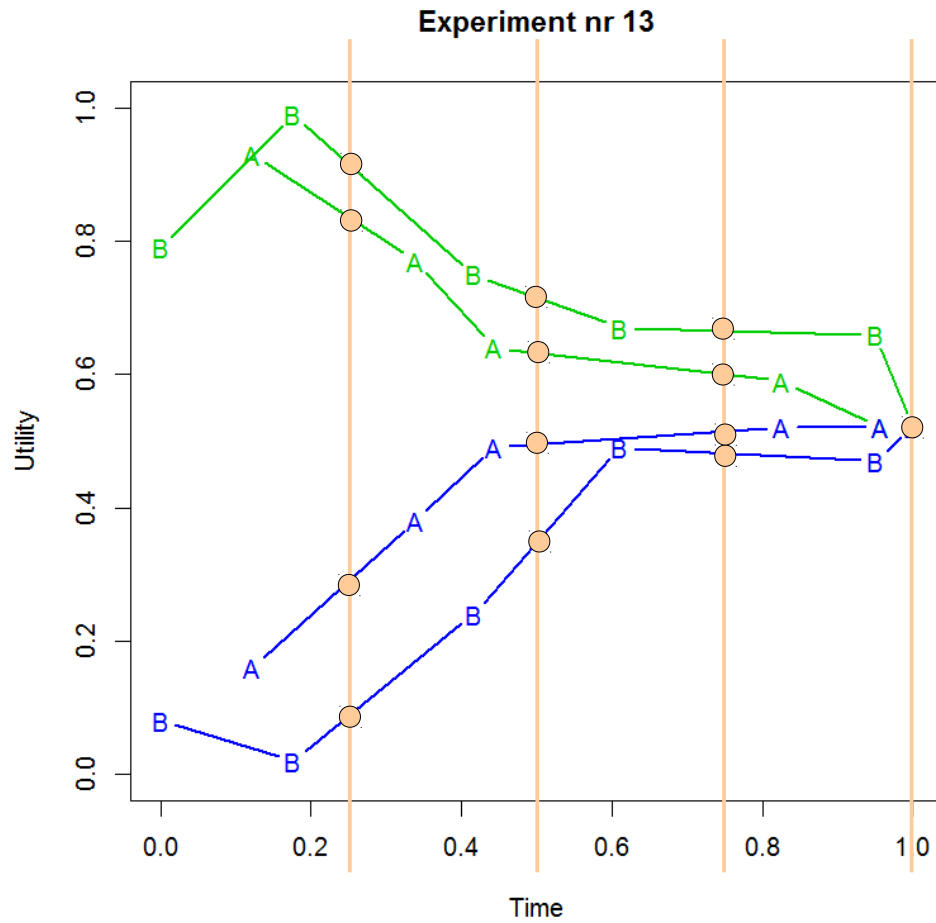
# Dynamics: Levels of analysis





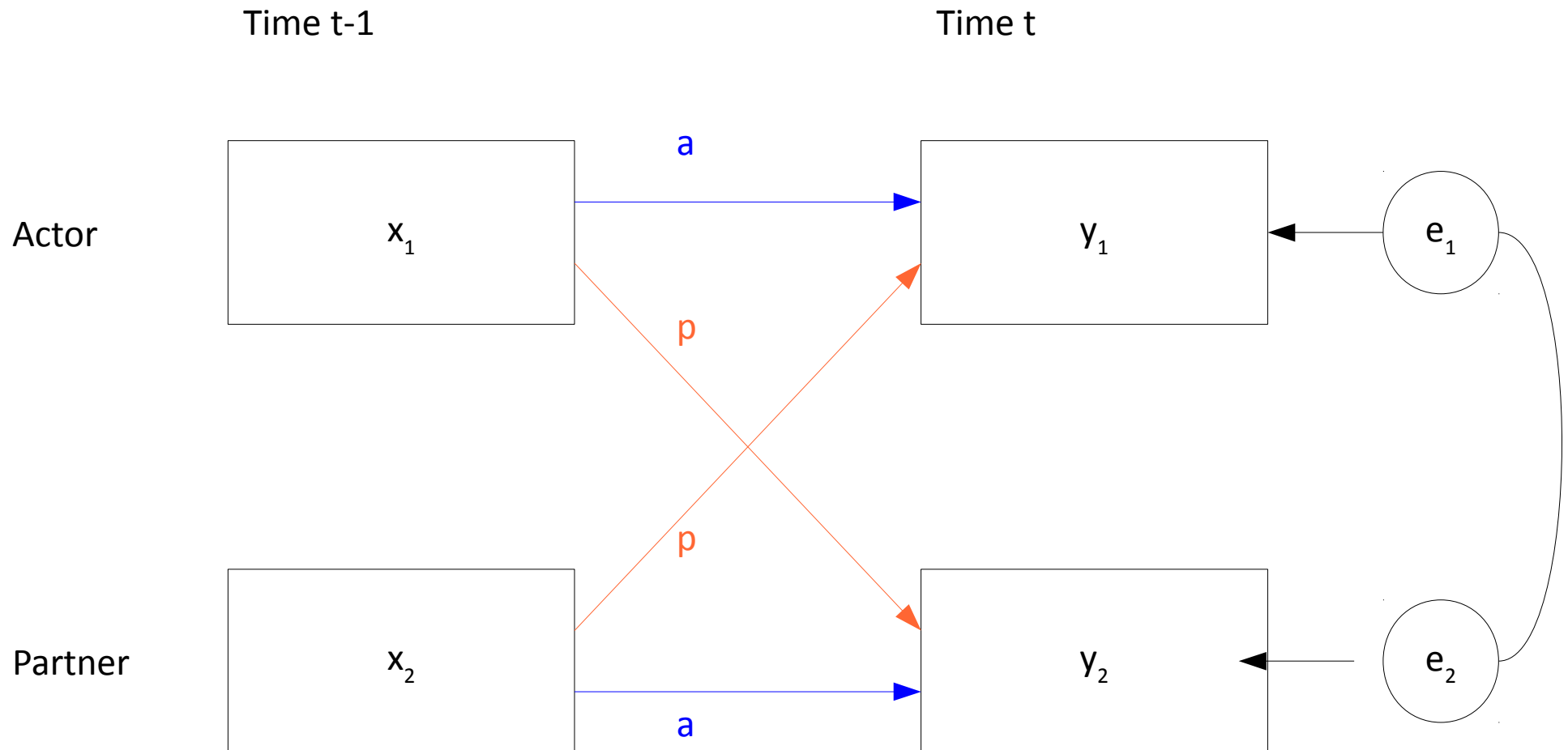
- Stage models:
  - Predefined sequence of stages
  - Often equal/arbitrary length
  - Behavior within phase heterogeneous
- Episodic models:
  - “Turning points” between phases
  - Sequence of phases might vary between negotiations
  - Homogeneous behavior within each phase

# Phase level: Standardized interpolated negotiation processes



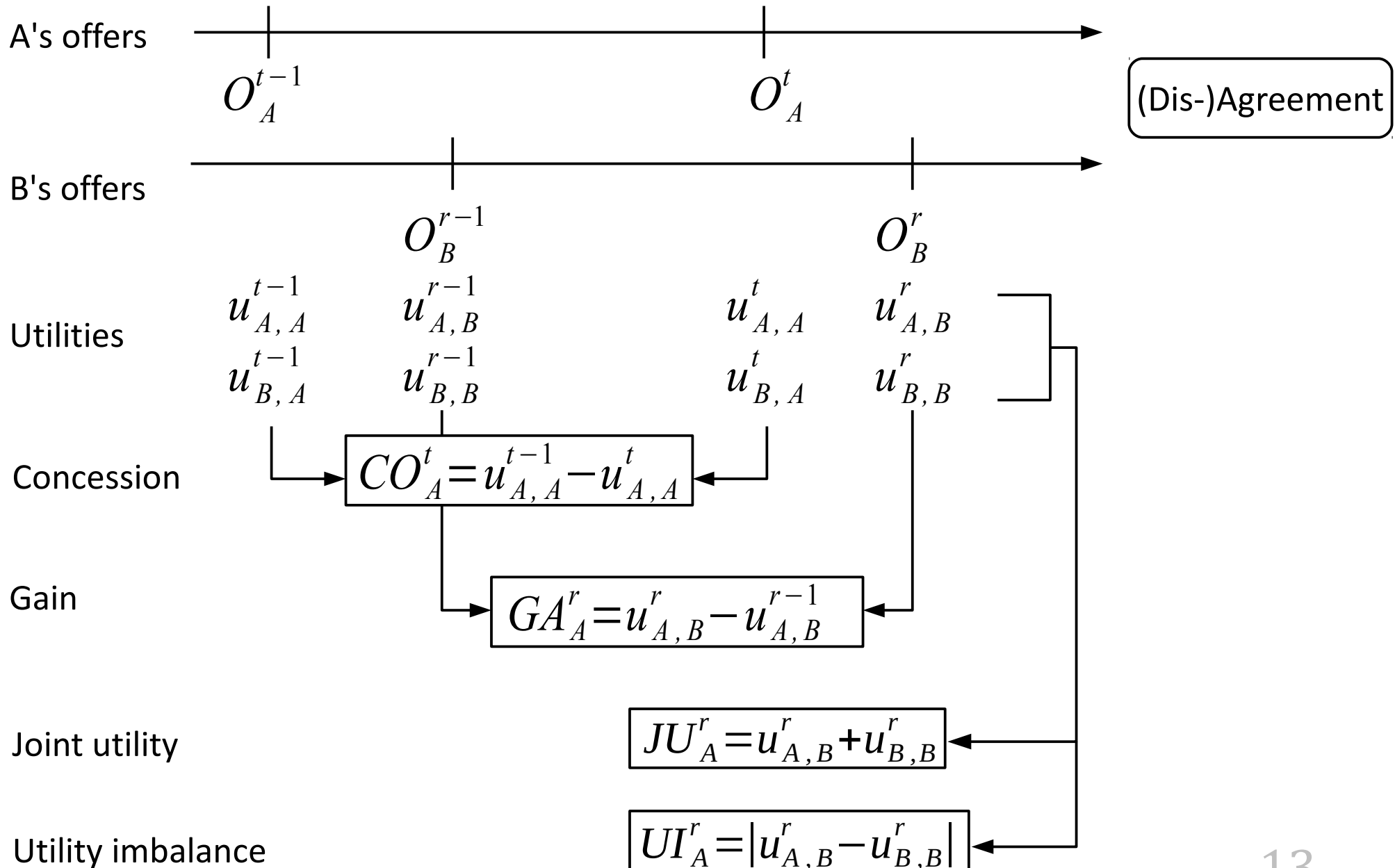
# Interaction level: APIM

## Actor – Partner Interdependence Model





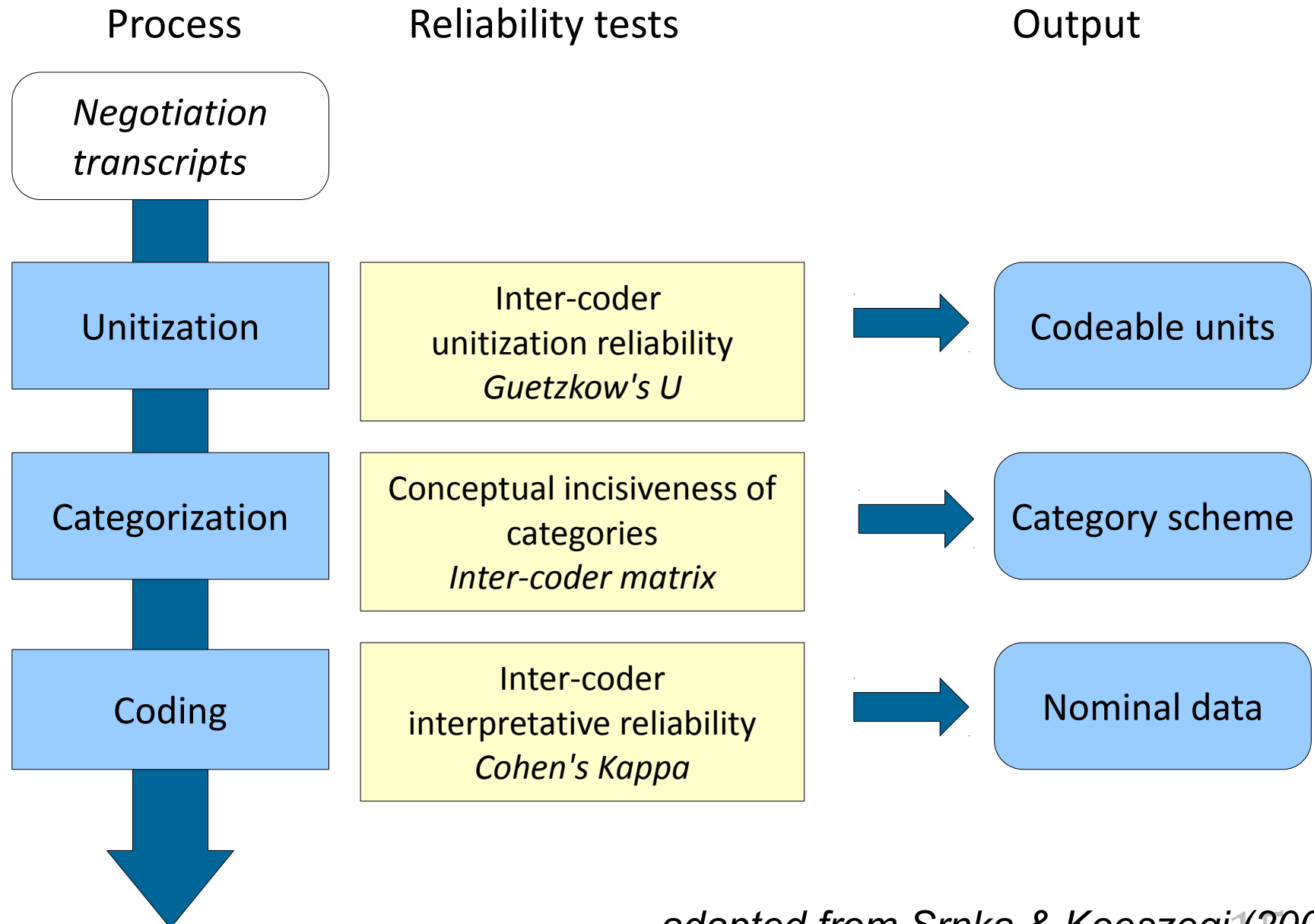
# Measurement: Substantive level



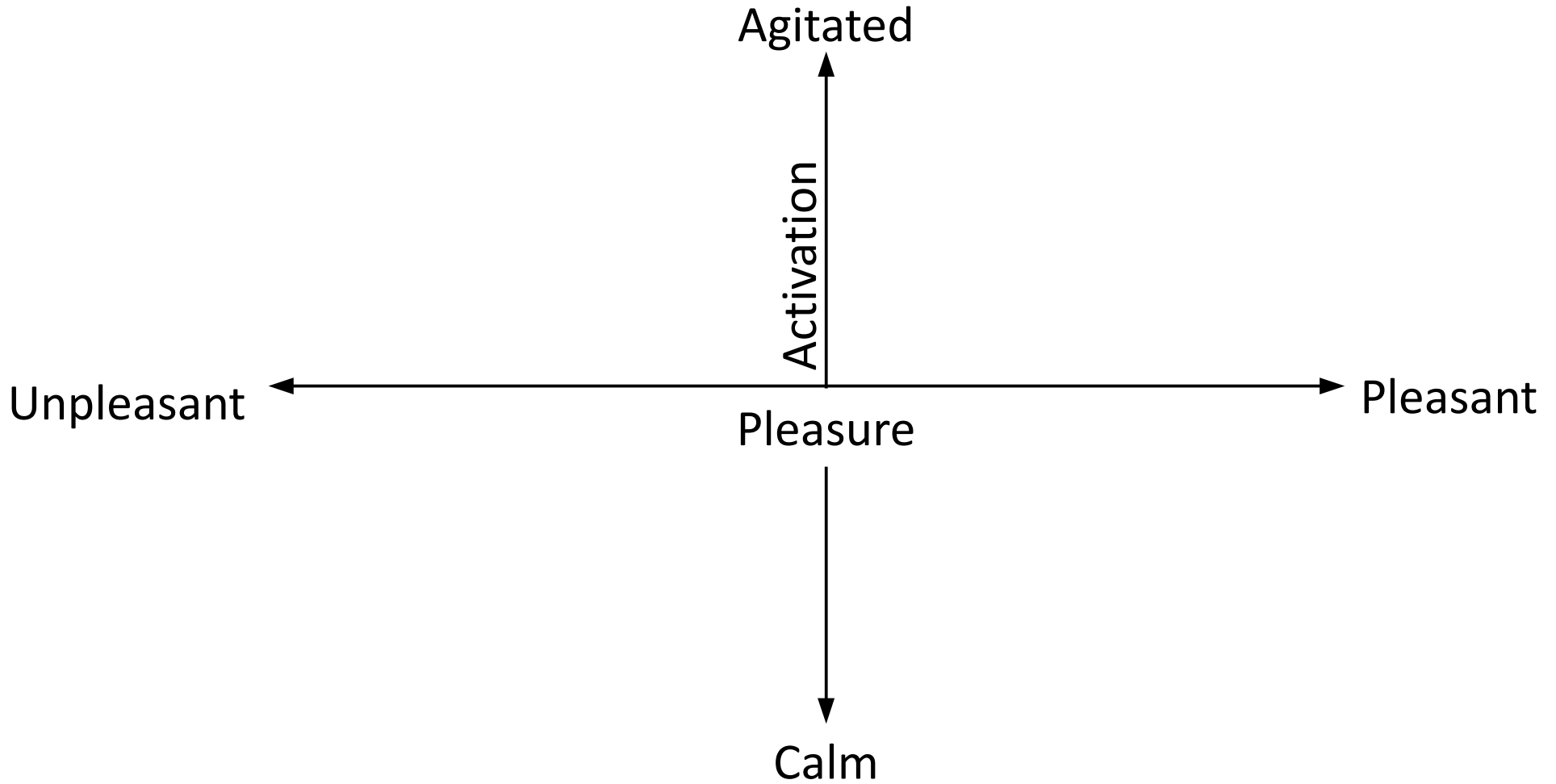
# Measurement: Communication types

|                    |             | Strategic orientation   |   |
|--------------------|-------------|---|---|
|                    |             | Distributive  | Integrative   |
| Strategic function | Information | Distributive information <ul style="list-style-type: none"><li>• Positions</li><li>• Facts</li></ul>  | Integrative information <ul style="list-style-type: none"><li>• Priorities</li><li>• Needs</li><li>• Interests</li></ul>                                  |
|                    | Action      | Claiming value <ul style="list-style-type: none"><li>• Substantiation</li><li>• Threats</li><li>• Power use</li><li>• Bottom line</li><li>• Single issue offers</li></ul> | Creating value <ul style="list-style-type: none"><li>• Packaging</li><li>• Trade-offs</li><li>• Creative solutions</li><li>• Multi-issue offers</li></ul> |

# Measurement of communication: Content analysis

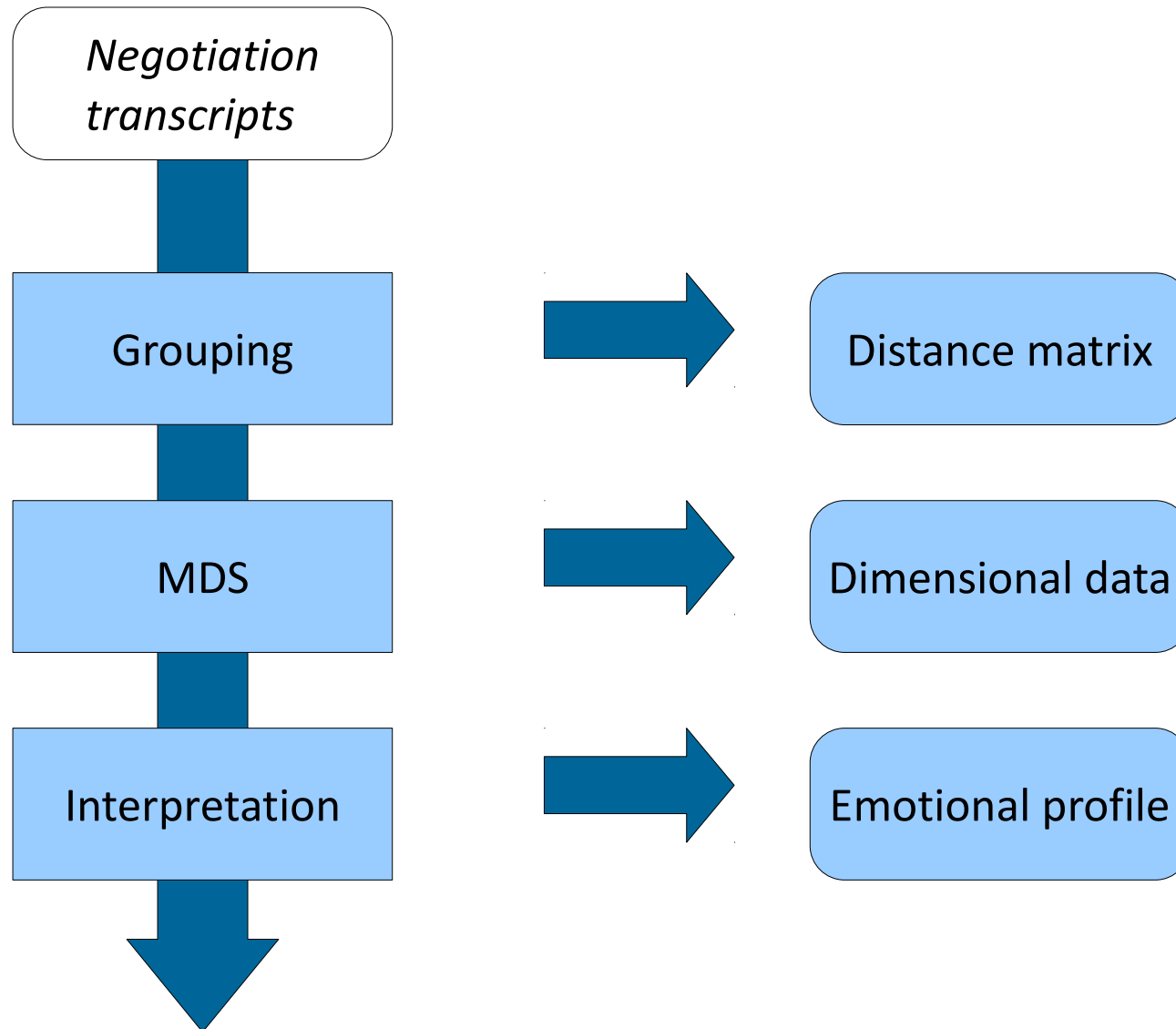


# Emotions: Dimensions





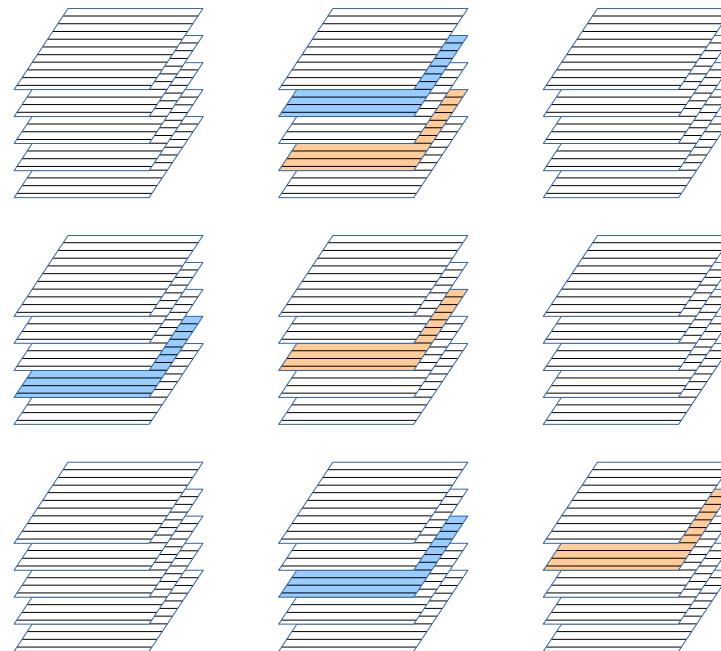
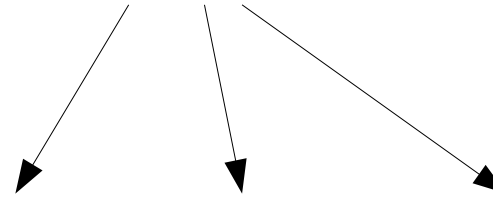
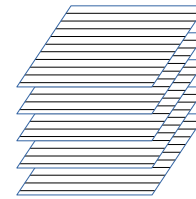
# Measuring emotions



# Measuring emotions



Messages

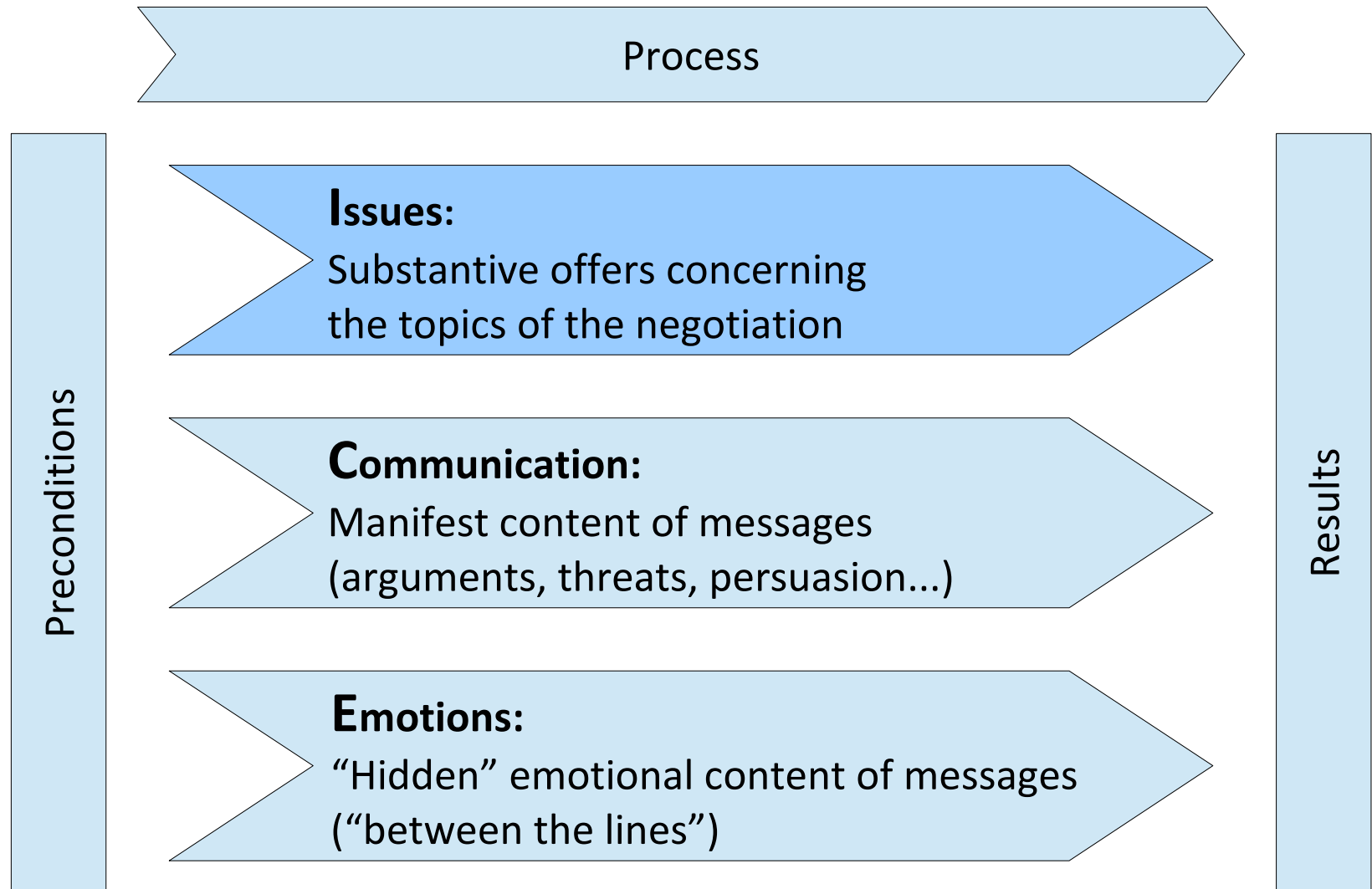


Sorted onto different stacks by several raters according to “emotional similarity”

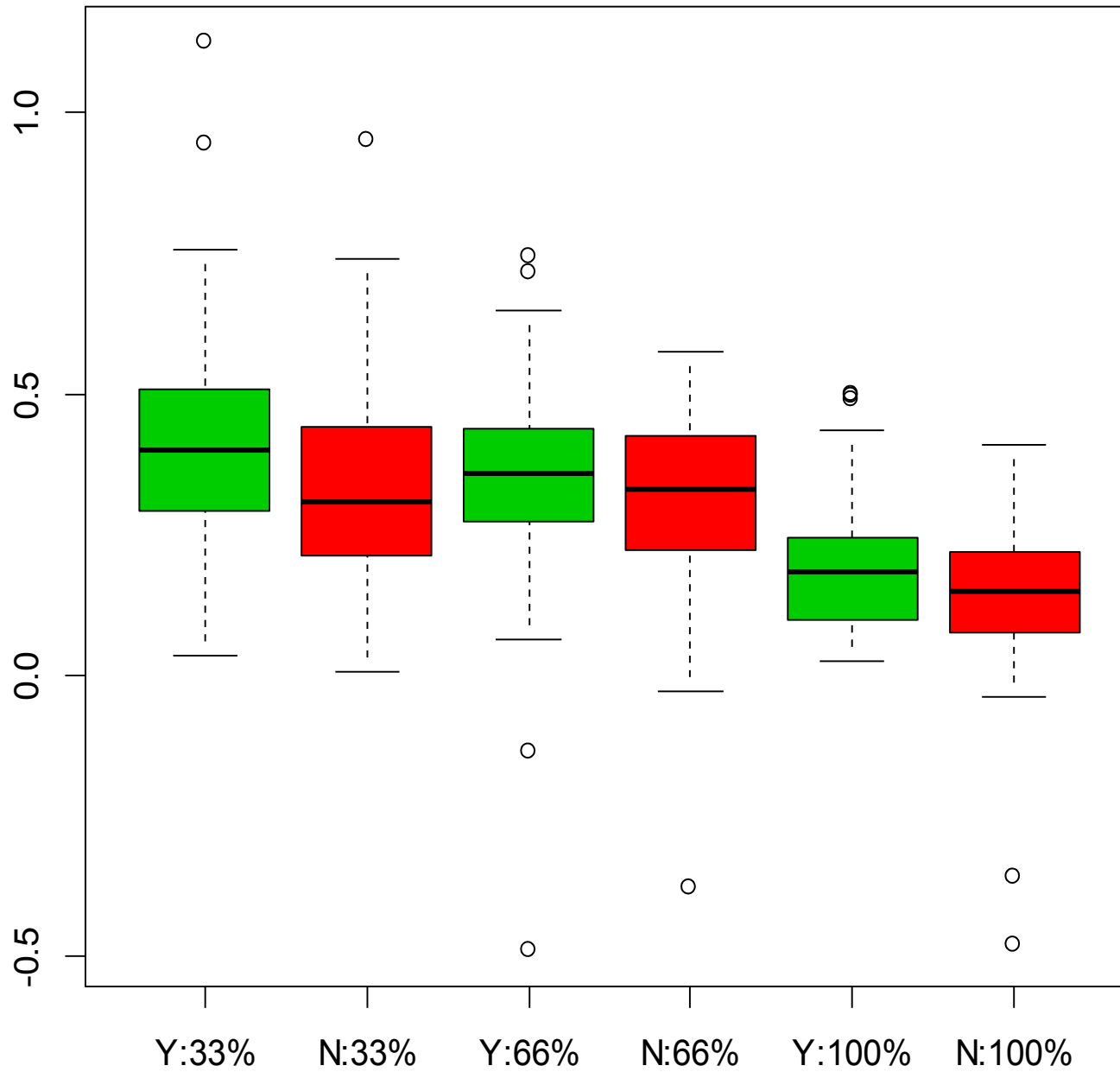
Different raters

“Distance” between two messages: Number of raters who put messages on different stacks

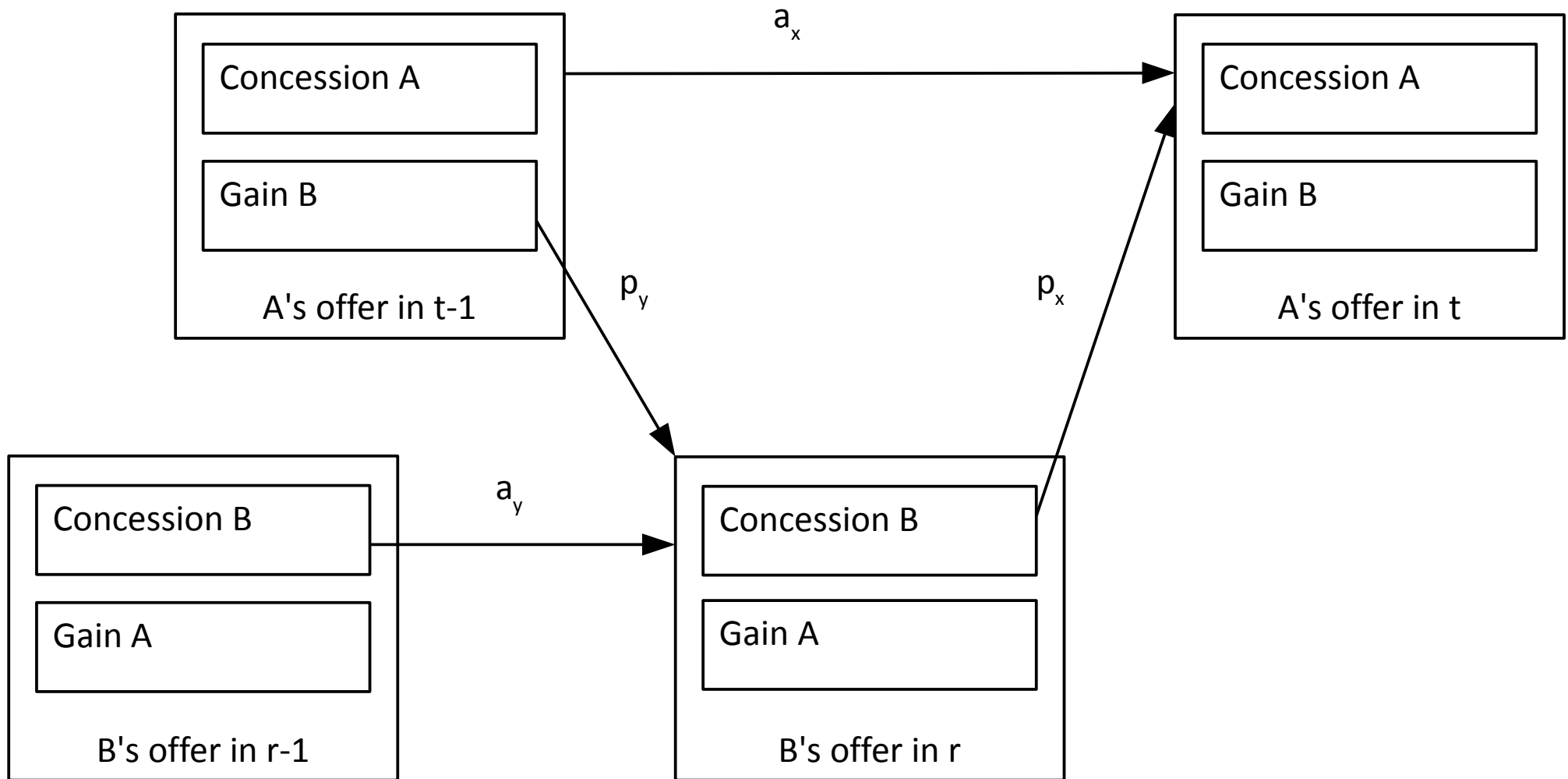
# Micro models within one level Substantive



# Concessions patterns and agreement



# Extended APIM



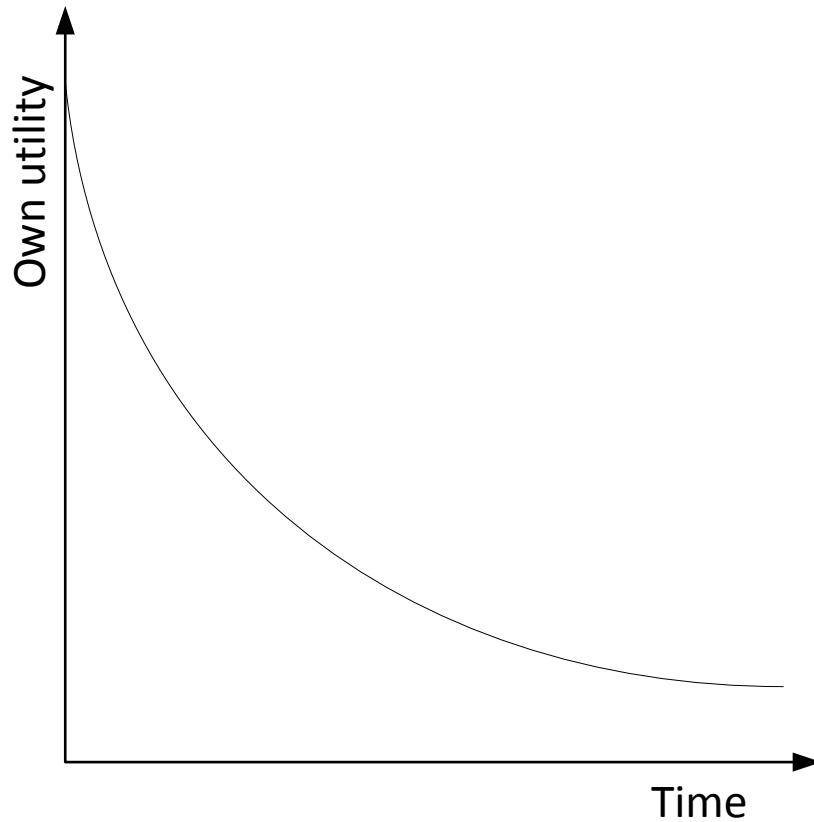
# Interpretation of coefficients – Hypotheses



- Partner effect:
  - Relationship of concession to opponent's concession
  - Reciprocity
  - Partner effect should be larger in successful negotiations
- Actor effect:
  - Change of concessions over time
  - Negotiation strategy:  
Initially large, then decreasing (cooperative)  
vs. initially small, then increasing (competitive)
  - Actor effect negative in successful negotiations

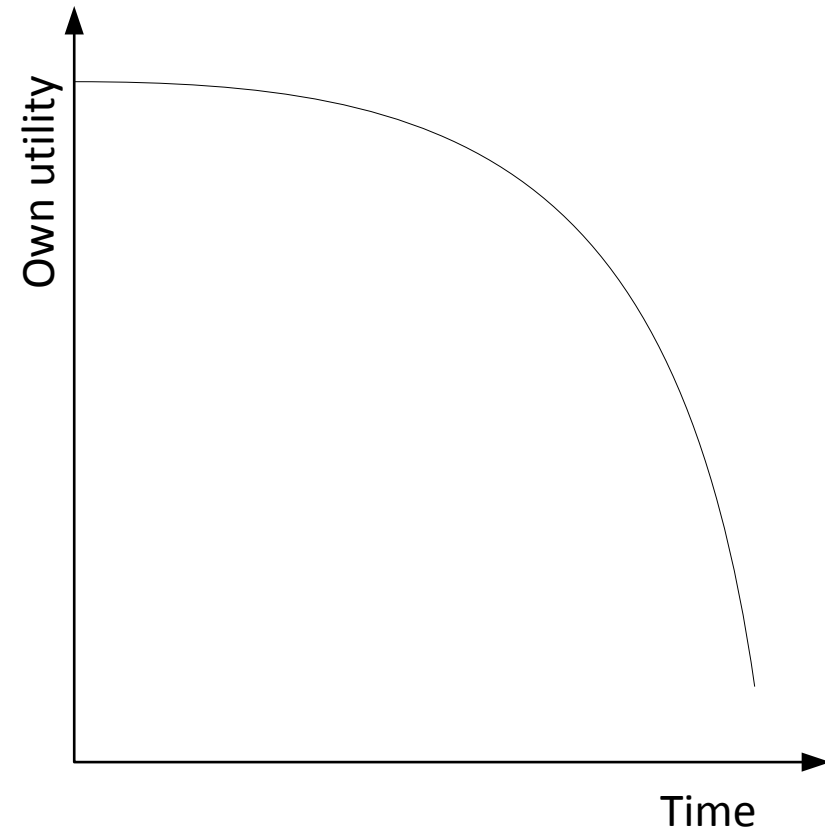
# Actor effect and negotiation strategy

## Cooperative strategy



- High concessions in beginning
- Level of concessions decreases
- Negative actor effect

## Competitive strategy



- Low concessions in beginning
- Level of concessions increases
- Positive actor effect

# APIM model – some results

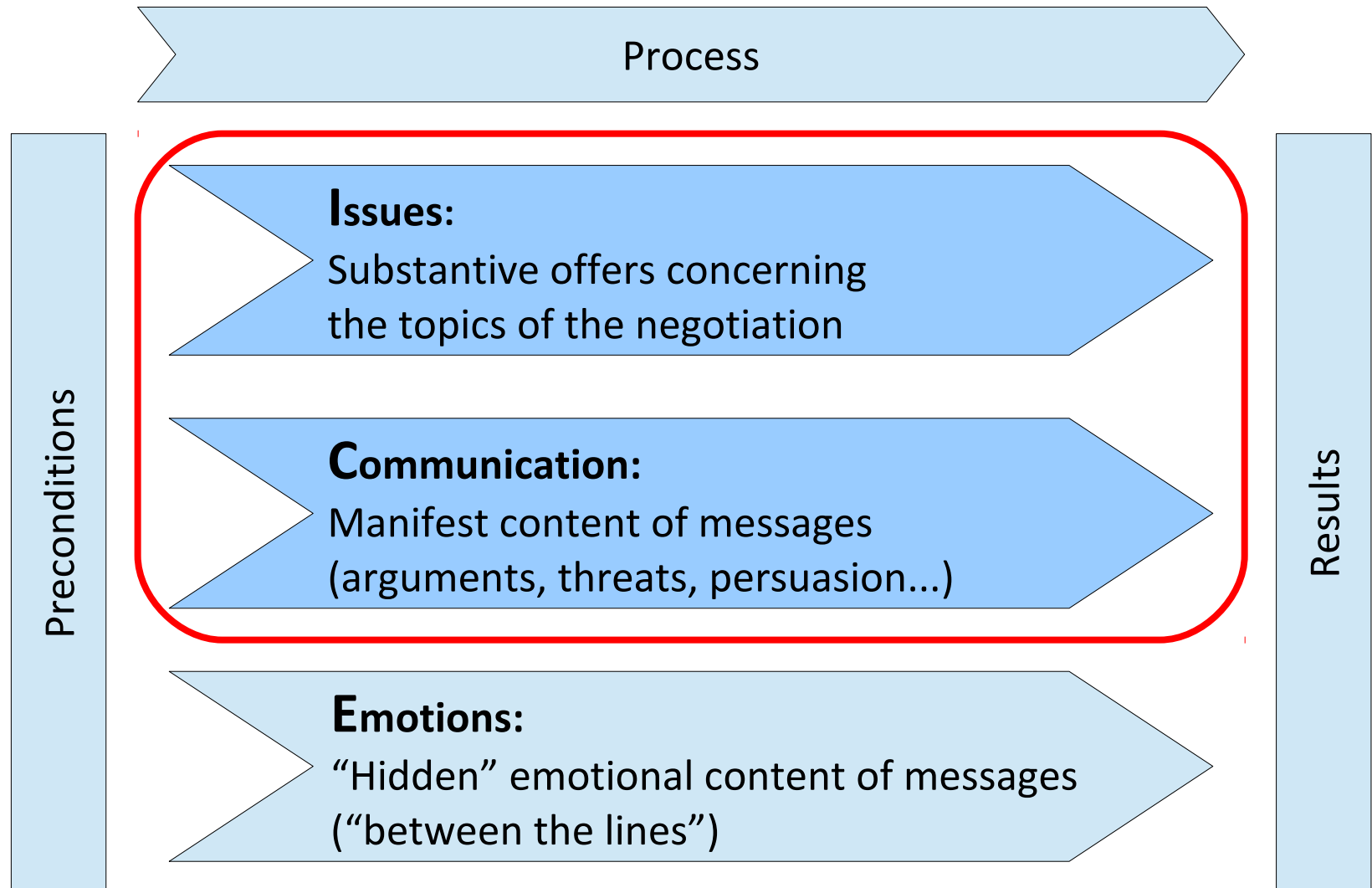
|                  | All         | Agreement   | No agreement |
|------------------|-------------|-------------|--------------|
| Phase 1          | *** 0.0520  | *** 0.0613  | 0.0113       |
| Phase 2          | *** 0.0579  | *** 0.0605  | *** 0.0481   |
| Phase 3          | *** 0.0272  | *** 0.0203  | *** 0.0467   |
| Role (buyer)     | ** 0.0147   | * 0.0138    | * 0.0197     |
| Actor (seller)   | *** -0.1369 | *** -0.1587 | ° -0.0975    |
| Actor (buyer)    | ° -0.0456   | * -0.0681   | 0.0296       |
| Partner (seller) | ° -0.0326   | * -0.0428   | -0.0009      |
| Partner (buyer)  | -0.0230     | ° -0.0357   | 0.0390       |
| AIC              | -3657.77    | -2714.69    | -906.91      |
| L. ratio         | *** 88.75   | *** 89.90   | 6.10         |

INSPIRE Database, 4210 offers from 475 negotiations (72% agreement)

*Vetschera, 2016*



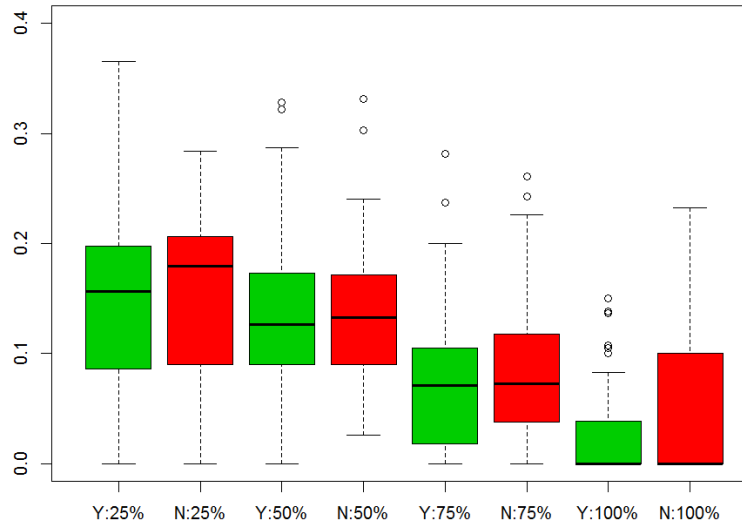
# Relationships: Substantive and communication



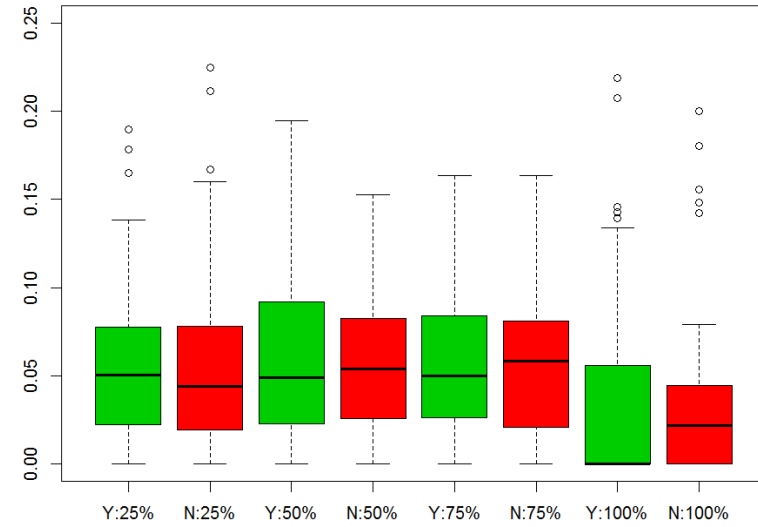
# Communication and agreement



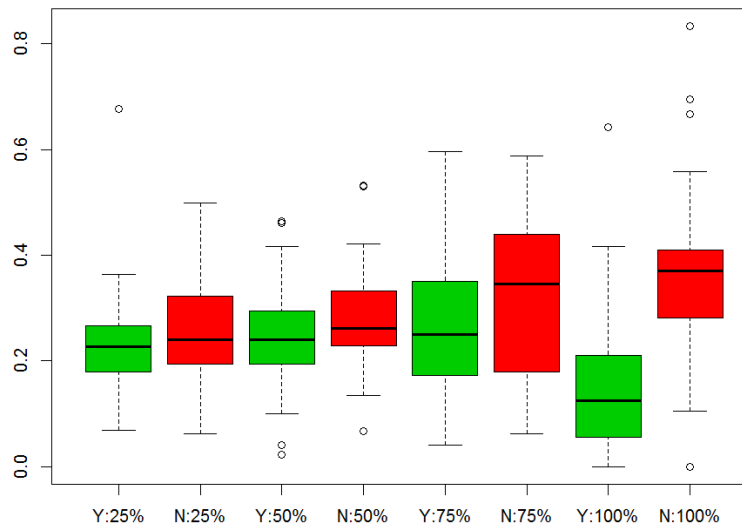
## Distributive information



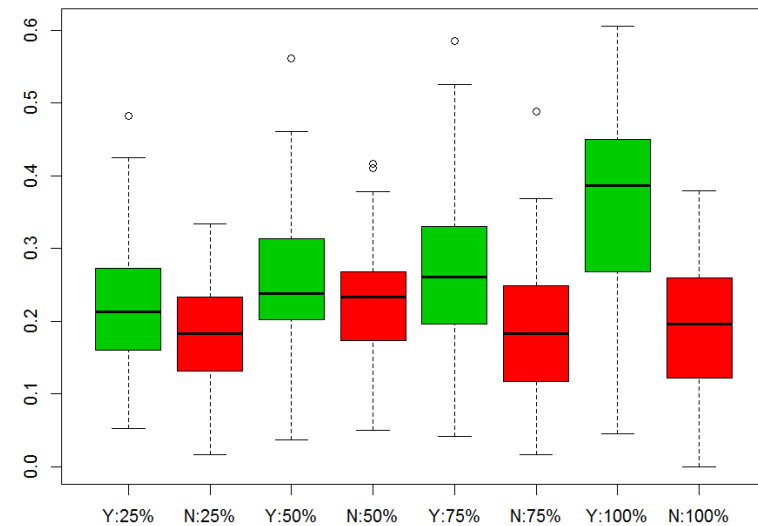
## Integrative information



## Claim value



## Create value



# Communication: Strategic action and agreement

|               | 25%       | 50%       | 75%       | 100%     |
|---------------|-----------|-----------|-----------|----------|
| Create value  |           |           |           |          |
| Median failed | 0.183     | 0.233     | 0.183     | 0.196    |
| Median agree  | 0.213     | 0.238     | 0.260     | 0.386    |
| Test          | o 1037    | n.s. 1212 | ** 870    | *** 443  |
| Claim value   |           |           |           |          |
| Median failed | 0.241     | 0.262     | 0.345     | 0.370    |
| Median agreed | 0.227     | 0.240     | 0.251     | 0.125    |
| Test          | n.s. 1714 | n.s. 1688 | n.s. 1772 | *** 2495 |

Median share of indicated type in total communication of phase  
Wilcoxon test

| <b>Joint utility</b>     | 25%   | 50%     | 75%      | 100%   |
|--------------------------|-------|---------|----------|--------|
| Create value             | 0.006 | * 0.204 | ** 0.249 | -0.067 |
| Claim value              | 0.070 | -0.145  | * -0.216 | -0.062 |
| Integrative information  | 0.096 | -0.068  | * -0.230 | 0.079  |
| Distributive information | 0.069 | 0.003   | 0.033    | 0.022  |

| <b>Contract imbalance</b> | 25%    | 50%      | 75%      | 100%      |
|---------------------------|--------|----------|----------|-----------|
| Create value              | 0.044  | * -0.219 | -0.022   | ** -0.260 |
| Claim value               | 0.015  | 0.119    | 0.017    | ° 0.166   |
| Integrative information   | -0.044 | 0.018    | 0.136    | * -0.192  |
| Distributive information  | -0.118 | -0.046   | ** 0.287 | ° 0.159   |

Correlation between offer's properties and share of communication type

*Filzmoser et al., 2016*

| Concessions              | 25%    | 50%    | 75%    | 100%     |
|--------------------------|--------|--------|--------|----------|
| Create value             | -0.057 | 0.111  | 0.059  | * 0.204  |
| Claim value              | -0.122 | 0.072  | 0.078  | * -0.196 |
| Integrative information  | 0.023  | -0.043 | -0.040 | 0.049    |
| Distributive information | 0.123  | -0.028 | -0.058 | 0.019    |

| Gains                    | 25%    | 50%    | 75%    | 100%     |
|--------------------------|--------|--------|--------|----------|
| Create value             | -0.045 | 0.117  | 0.090  | 0.094    |
| Claim value              | -0.068 | 0.088  | 0.000  | ° -0.184 |
| Integrative information  | 0.066  | -0.093 | -0.093 | 0.107    |
| Distributive information | 0.136  | 0.048  | 0.025  | 0.091    |

Correlation between offer's properties and share of communication type

# Communication and gains- lagged

|                   | Content → gain |         |         |          | Gain → content |          |          |
|-------------------|----------------|---------|---------|----------|----------------|----------|----------|
|                   | 25%            | 50%     | 75%     | 100%     | 50%            | 75%      | 100%     |
| Create value      | -0.052         | -0.114  | -0.030  | -0.060   | 0.078          | 0.094    | 0.105    |
| Claim value       | 0.084          | 0.117   | 0.031   | 0.028    | * -0.211       | ° -0.159 | ° -0.177 |
| Integrative info. | 0.035          | -0.130  | -0.045  | 0.136    | -0.024         | 0.012    | -0.036   |
| Distributive info | 0.066          | * 0.226 | ° 0.169 | ** 0.246 | -0.080         | -0.082   | -0.104   |

Players who use distributive information gain more in subsequent rounds

Players who received more claim less value in subsequent rounds

Lagged correlations between communication content and gain

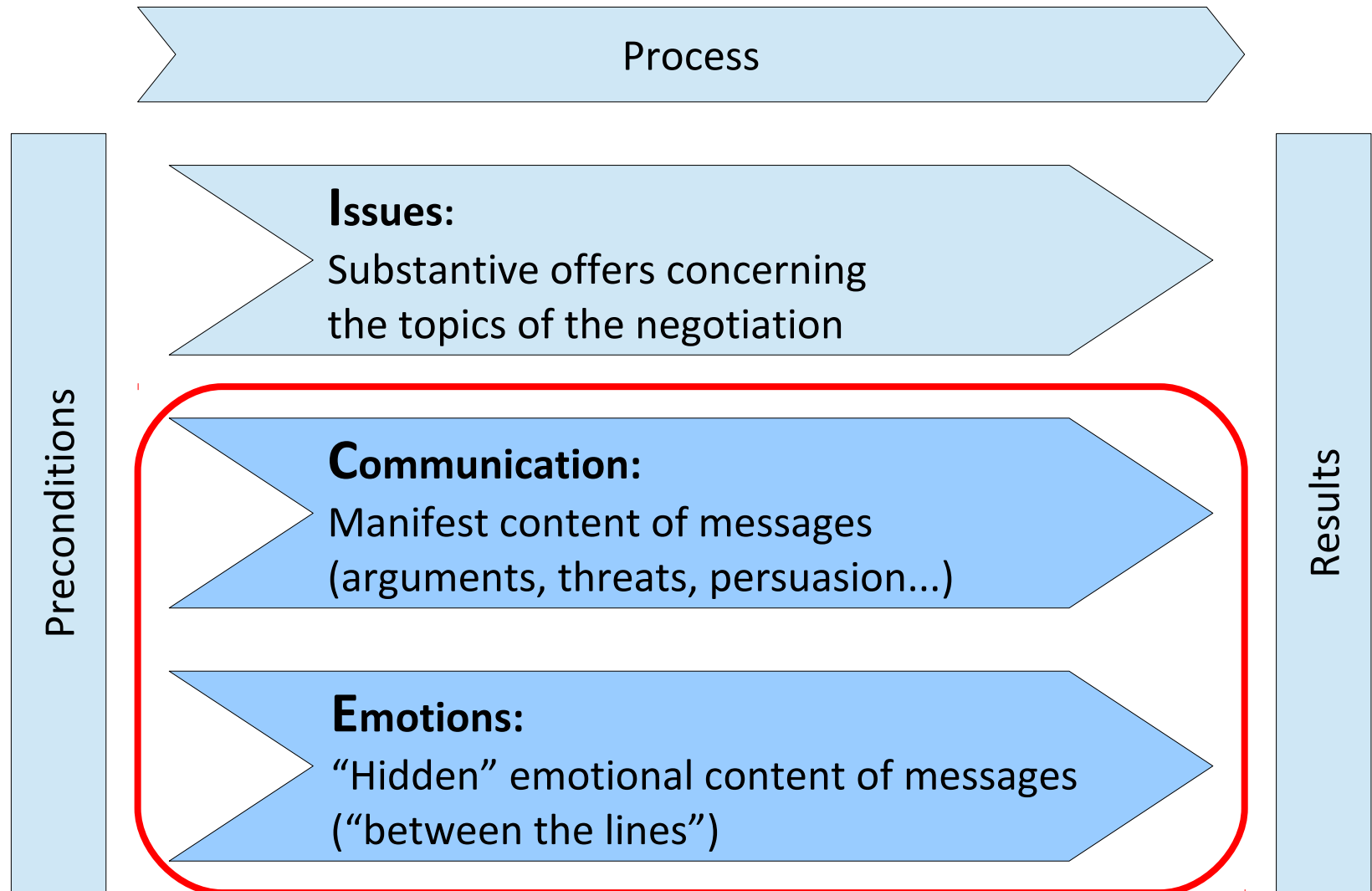
# Framing substantive behavior

Effects of differently framed messages on substantive offers by subjects

|               |              | Mean   | SD     |     |
|---------------|--------------|--------|--------|-----|
| Initial offer | Integrative  | 595.41 | 103.01 | * * |
|               | Distributive | 649.49 | 94.36  |     |
| Final offer   | Integrative  | 410.54 | 89.98  |     |
|               | Distributive | 413.08 | 103.63 |     |
| Concession    | Integrative  | 184.86 | 95.48  | * * |
|               | Distributive | 236.41 | 93.15  |     |

Values: Utility of party making the offer

# Relationships: Communication and emotions





| <b>Valence</b>           | 25%        | 50%        | 75%        | 100%       |
|--------------------------|------------|------------|------------|------------|
| Create value             | *** 0.567  | *** 0.427  | *** 0.672  | *** 0.695  |
| Claim value              | *** -0.442 | *** -0.620 | *** -0.553 | *** -0.463 |
| Integrative information  | -0.187     | 0.045      | -0.154     | 0.002      |
| Distributive information | * -0.288   | 0.065      | -0.098     | ° -0.253   |
| <b>Arousal</b>           | 25%        | 50%        | 75%        | 100%       |
| Create value             | 0.203      | -0.132     | -0.180     | 0.068      |
| Claim value              | -0.044     | ° 0.226    | * 0.338    | * 0.330    |
| Integrative info         | 0.121      | -0.094     | * 0.301    | ° 0.250    |
| Distributive info        | 0.074      | 0.169      | 0.110      | 0.095      |

Claiming value is linked to strong negative emotions

*Filzmoser et al. 2016*

# Emotions and own/opponent communication

|               |            | Own communication |            |            |            | Opponent |            |           |         |
|---------------|------------|-------------------|------------|------------|------------|----------|------------|-----------|---------|
|               |            | 25                | 50         | 75         | 100        | 25       | 50         | 75        | 100     |
| Create value  | Valence    | *** 0.533         | *** 0.367  | *** 0.569  | *** 0.616  | ° 0.174  | 0.131      | *** 0.330 | * 0.212 |
|               | Activation | ° 0.178           | -0.020     | -0.090     | -0.086     | 0.038    | -0.123     | ° -0.158  | ° 0.158 |
| Claim value   | Valence    | *** -0.339        | *** -0.480 | *** -0.506 | *** -0.433 | * -0.213 | *** -0.311 | * -0.209  | -0.144  |
|               | Activation | -0.064            | ° 0.160    | ° 0.176    | *** 0.299  | 0.018    | 0.108      | ** 0.274  | 0.069   |
| Integr. info. | Valence    | * -0.187          | -0.047     | * -0.201   | -0.039     | -0.053   | 0.099      | 0.011     | 0.041   |
|               | Activation | -0.015            | 0.002      | ** 0.245   | 0.089      | 0.147    | -0.103     | 0.139     | ° 0.163 |
| Distr. info.  | Valence    | ** -0.258         | 0.072      | -0.017     | ** -0.218  | -0.135   | 0.013      | -0.113    | -0.084  |
|               | Activation | 0.005             | 0.004      | 0.004      | 0.050      | 0.081    | ** 0.201   | 0.146     | 0.052   |

Filzmoser et al. 2016

- Negotiation processes can only be understood by considering **all dimensions**
- By now, reliable methods for **measurement** of all dimensions are available
- Although there is progress, modeling the **time structure** is still a challenge
- Only few studies consider **interactions** between dimensions
- Here, the question of **causality** is mostly open

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**Thank you for your attention!**

