Embodied Synchrony in Social Interaction

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Outline

1. What is embodied synchrony?
   Nagaoka, Komori, Yoshikawa (2007)

2. Congruence of paralanguage
   Nagaoka, Komori, Nakamura, Draguna (2005)

3. Body movement synchrony
   Nagaoka, Komori (2008)

Embodied Synchrony
Nagaoka, Komori, Yoshikawa (2007)

In a neonate - adult interaction
- Entrainment
- Neonate imitation

In a neonate - infant interaction
- Coordinated interpersonal timing
- Neonate imitation
- Congruence of paralanguage

In an adult - infant interaction
- Interactional synchrony (of body movement)
- Postural mirroring
- Mimicry of facial expressions, mannerisms
- Yawn contagion
- Congruence of paralanguage

In an intercultural interaction
- Convergence of accent, language and speech rate

Socialization and Congruence
Welkowitz, Cariffe, Feldstein (1976)

- In an infant - infant interaction (20-min.)
  - Congruence of duration of pauses was analyzed.
    - Silences within the utterances of a speaker

Socialization and Congruence
Welkowitz, Cariffe, Feldstein (1976)

- In an infant - infant interaction (20-min.)
  - Congruence of duration of pauses was analyzed.
    - The intraclass correlation coefficients of the median of pauses were calculated.

<table>
<thead>
<tr>
<th>Occasion</th>
<th>Younger Group [5-year-old]</th>
<th>Elder Group [6-year-old]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.29</td>
<td>.90**</td>
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</table>
| 2        | .54**                      | .94**                    | ** p < .01

The response latencies of the two speakers in the same pair were similar.
Is embodied synchrony always observed in an adult-adult interaction?

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Study 1: Congruence of paralanguage  
Nagaoka, Komori, Nakamura, Draguna (2005)

Study 2: Body movement synchrony  
Nagaoka, Komori (2008)

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Study 1

Hypothesis
Is congruence of paralanguage always observed in an adult-adult interaction?

- Hypothesis: Speaker’s receptiveness affects congruence of paralanguage in an adult-adult interaction.
- Receptiveness is willing to accept the partner.
- Previous researches imply that congruence of posture is related to receptiveness.

Method

Participants
- 12 dyads of speakers holding opposing opinions on a certain topic.
  - Undergraduate and graduate students of university
  - Topics: “women-only cars should be introduced into all trains,” “brain death is real death,” “nuclear energy,” “capital punishment,” etc.
  - The participants of each dyads had never met before and were of the same sex.

Conditions
- **Compromise condition**
  - With receptiveness to the partner
  - Participants were asked to achieve a compromise by discussion and considering the partner’s opinion.

- **Debate condition**
  - Without receptiveness
  - Participants were asked to impose their opinion on the partner.

Procedure
- Six dyads were assigned to compromise conditions, other six dyads debate condition.
- 15-min. dialogue

The dialogue were digitally recorded.
  - We analyzed congruence of duration of response latencies.
Study 1: The Measurement Method

- Response latency: latency before responding to the partner’s last utterance

Speaker 1’s turn taking
Speaker 2’s turn taking

Speaker 1’s utterance start time
Speaker 2’s utterance start time
Speaker 1’s utterance finish time
Speaker 2’s utterance finish time

Study 1: Results

• Compromise condition
• Debate condition

A significant difference in duration of response latencies between the two conditions was found ($\chi^2(N=345) = 4.41, p < .05$).

Study 1: Results

- The 15-min. dialogue were divided.
  - First phase: the first 7.5 min. of the dialogue
  - Second phase: the second 7.5 min. of the dialogue

- The intraclass correlation coefficients of the median of response latencies were calculated.

Study 1: Results

- The similarity of response latencies of the two speakers increased over time course in compromise condition.

Study 1: Results

- Speaker’s receptiveness affects congruence of response latency in an adult-adult interaction.
  - Receptiveness to a partner requires openness to accept that the partner may have original idea, emotion, or different behavior patterns.
  - Receptiveness makes the relationship with the partner smooth and stable.
  - c.f. Empathy of a counselor in psychotherapy
Study 2

Body movement synchrony

Hypothesis

Previous study: Body movement synchrony is observed in a session of psychotherapy.

- Hypothesis 1: The quality of therapy (i.e., client-counselor relationship) affects the degree of body movement synchrony.
- Hypothesis 2: The degree of body movement synchrony changes according to time of a session.

Method

We analyzed four 50-min. psychotherapy sessions (client-counselor) and two 50-min. advice sessions (client-high school teacher).

Low evaluation group
- Lowly evaluated by experts.

High evaluation group
- Highly evaluated by experts.

The same client
- The same client

Discrete Fourier transformation (DFT) with a window length of 5 seconds and a window shift of 5 seconds

Temporal Pattern of Synchrony

Therapy Session

- Stability over the long time
- Rapid increase
- Slow coming back

Power

0.6 - 2.4 Hz

0 5 10 15 20 25 30 35 40 45

Correlation Coefficient

-0.6 - 0.6

Time (MIN)
Study 2

Results
- The coefficients were higher for the high evaluation group than the low evaluation group.
- There is a consistent temporal pattern among the four therapy cases.
  In a session
  - Phase 1: Stability over the long time, in the first half.
  - Phase 2: A rapid increase in the middle phase.
  - Phase 3: Coming back to the level at the beginning in the final phase.
  - This pattern suggests the features of client-counselor relationship.

Discussion
- Embodied synchrony reflects the relationship between participants in an adult-adult interaction.
- Embodied synchrony is useful as an indicator of the relationship.

References
- Study 1
- Study 2