

How gesture and speech  
disambiguate the possible  
viewpoints?

- Intra- and Interpersonal solutions for the  
ambiguity of left/right in Japanese. -

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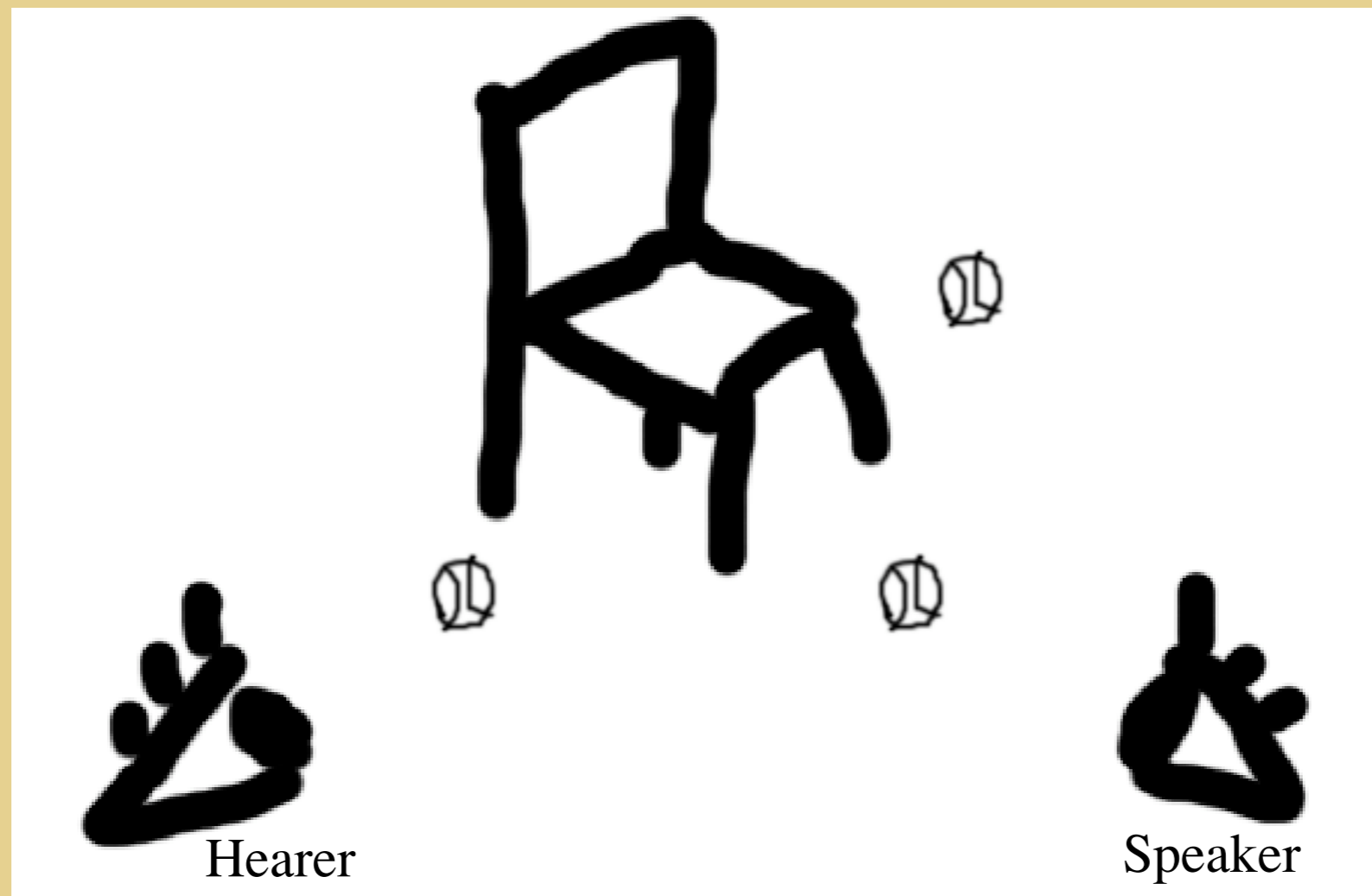
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Levinson (1996) defined  
3 linguistic frames of  
reference.

|                 |                                      |
|-----------------|--------------------------------------|
| Intrinsic       | The ball is in front of me           |
| <u>Relative</u> | The ball is to the right of the lamp |
| Absolute        | The ball is north of me              |

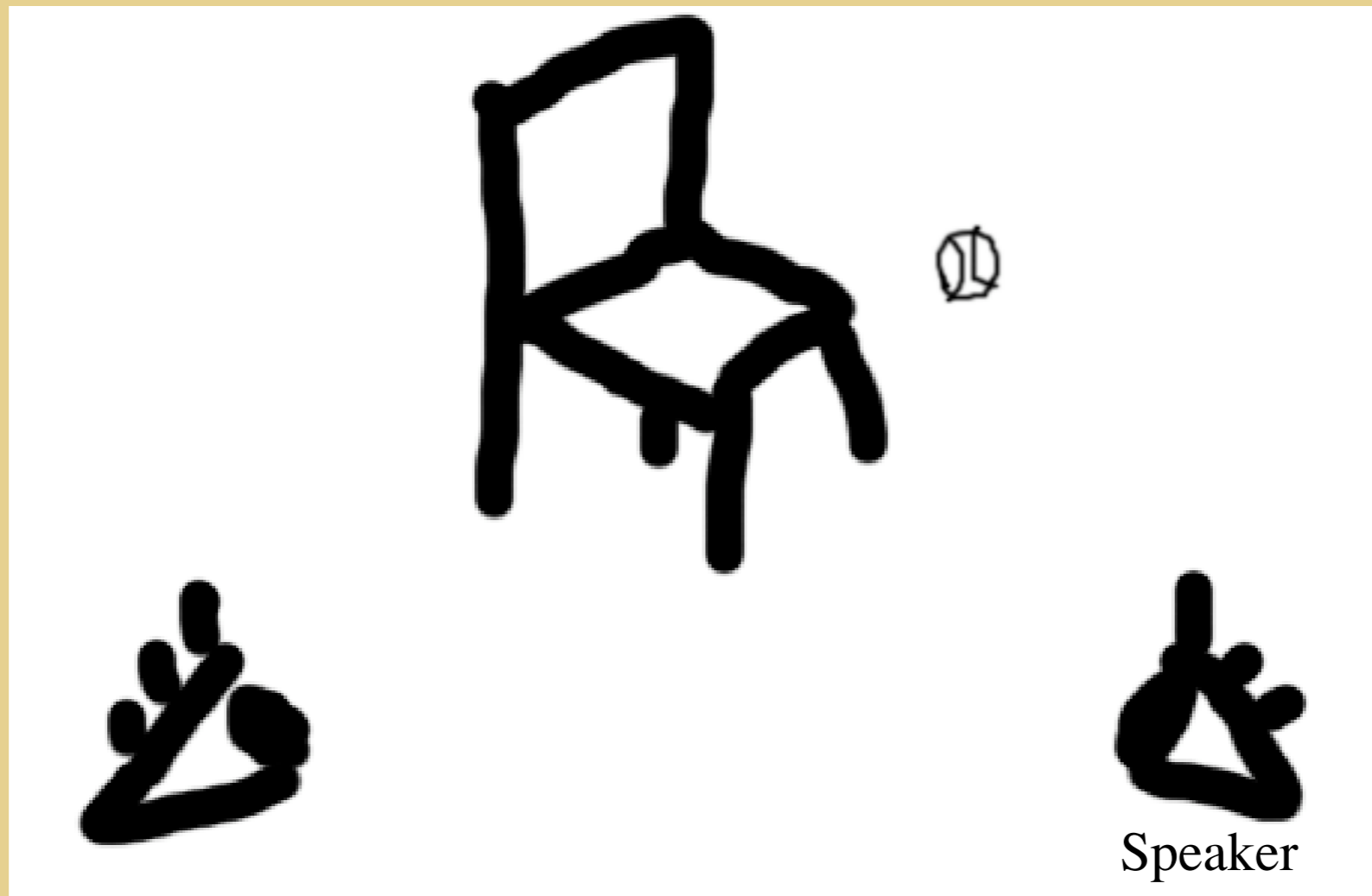
The problem of the relative frame of reference: Where is the viewpoint?

- ◆ Speaker: “The ball to right of chair..”



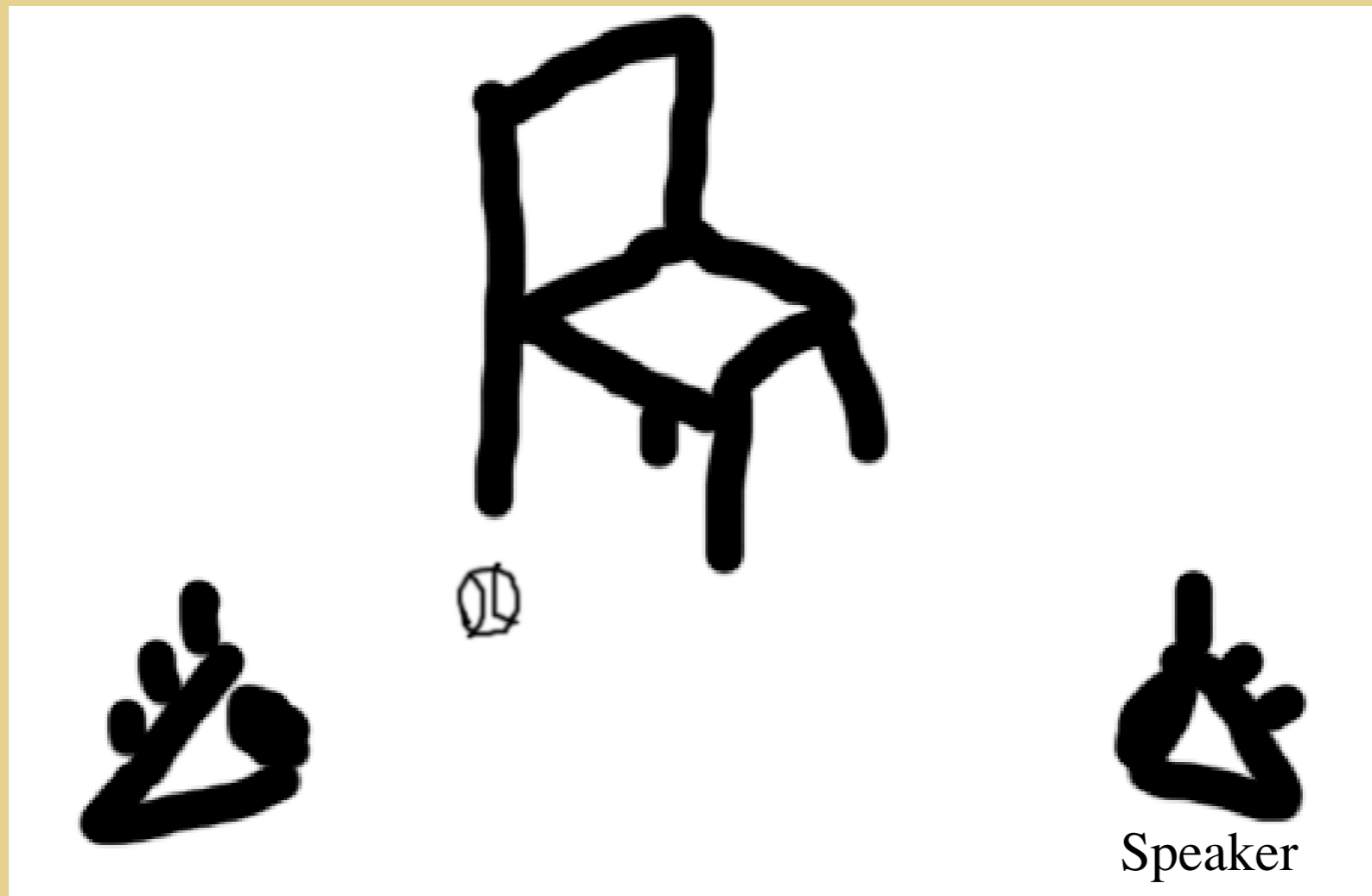
# Reducing the ambiguity of viewpoints in English (1)

- ◆ Speaker: “The ball is to the right of chair.”



# Reducing the ambiguity of viewpoints in English (2)

- ◆ Speaker: “The ball is at the chair’s right.”

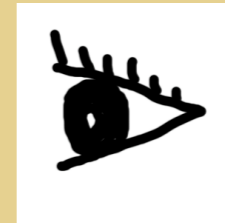


# The ambiguity of viewpoints in Japanese.

- ◆ それは 彼 の 左 に あります。  
Sore wa kare no hidari ni arimasu.  
(It SUB he GEN left LOC is)

?

From whose  
viewpoint,  
speaker's or his?



?

# The ambiguity of viewpoints in Japanese can be confirmed by a simple questionnaire.

- ◆ “Read the following text, and draw it in a picture.”

“ Bさんとお兄さんはコタツに向かい合わせに座っています。お兄さんの左にはネコがいます。 (B and B's brother are sitting at a table face to face. The brother GEN left LOC a cat is. ) ”

- ◆ 22 Japanese participants drew the cat at the brother's left, and 11 drew the cat at the brother's right.

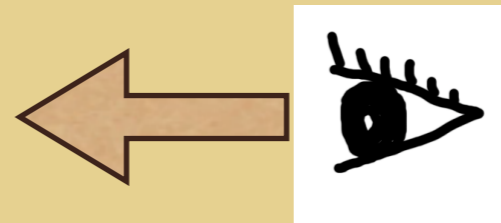
Adding an expression of the  
**viewpoint**, we can disambiguate  
left/right...

◆ 私から見て F は彼の左にあります。

I LOC see, F SUB he GEN left is.

From my point of view, F is to the left (of him)

right



left



but most of us are unconscious  
about the ambiguity.

- ◆ When **33 participants** were given text including an ambiguous expression of left/right in Japanese and asked to explain them to their partners, **only 3 pairs** discussed about the ambiguity.

Q:

1) How participants communicate with such ambiguity of viewpoints?

2) If the ambiguity of left/right remains in the speech, are there any solutions to reduce it?

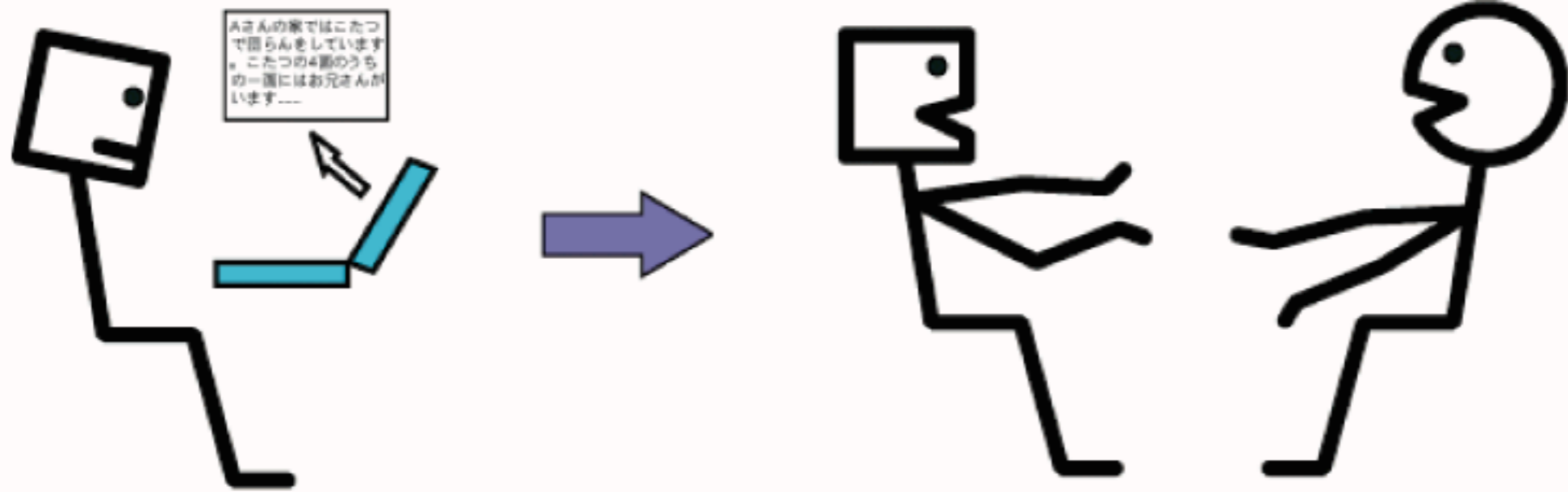
# Experiment using recall task

- ◆ 2 types of text describing spatial arrangements:
  - 1) with the ambiguity of left/right
  - 2) without the ambiguity
- ◆ The informant read one of 2 episodes, and tell the arrangement to the recipient with speech and gesture.
- ◆ The recipient can ask about the episode with speech and gesture.

# the episode with the ambiguity

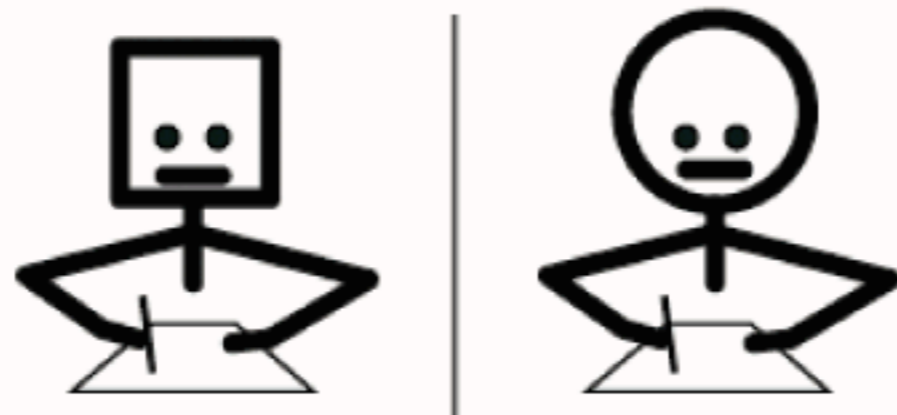
- ◆ B's family have a dinner at the Kotatsu table...
- ◆ B and B's brother are sitting face to face...
- ◆ A cat is left LOC the brother.

# The Procedure



Show the episode to the informant

The informant explains it to the recipient with speech and gesture



Each participant draws it in a picture

Did the informants produced gestures for the ambiguity?

| Informant's gesture | Ambiguity of left/right in the text |    |
|---------------------|-------------------------------------|----|
|                     | +                                   | -  |
| +                   | 20                                  | 33 |
| -                   | 5                                   | 0  |

(Exact test,  $p > 0.1$ )

Did the recipients produced gestures  
for the ambiguity?

---

| Recipient's<br>gesture | Ambiguity of<br>left/right in the text |    |
|------------------------|--|----|
|                        | +                                      | -  |
| +                      | 26                                     | 14 |
| -                      | 7                                      | 11 |

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( $\chi^2$ -test,  $p=0.087$ )

Did the recipients' gesture related to the coincidence between 2 participants?

---

| Recipient's gesture | Coincidence of left/right between the informant and the recipient |   |
|---------------------|---|---|
|                     | +   | - |
| +                   | 17  | 6 |
| -                   | 2   | 5 |

---

(Exact-test,  $p=0.068$ )

3 pairs who noticed the 2 possibilities of viewpoints were omitted from data



# Conclusion (1)

- ◆ The ambiguity of left/right causes misunderstanding between the informant and the recipient.
- ◆ Gestures of the informant's and the recipient's would reduce the ambiguity in some way.

# Fine analysis

- ◆ How gesture and speech reduce the ambiguity?

3 Points to describe the relative  
frame of reference:

Origin    Relatum    Figure

- ◆ The cat is to the right of the brother,  
from B's point of view.

Origin:    B

Relatum:  the brother

Figure:    the cat

When the gesture points out the arrangement of O, R and F, the relative frame would be explicit,



but some gestures do not.



2002/07/10

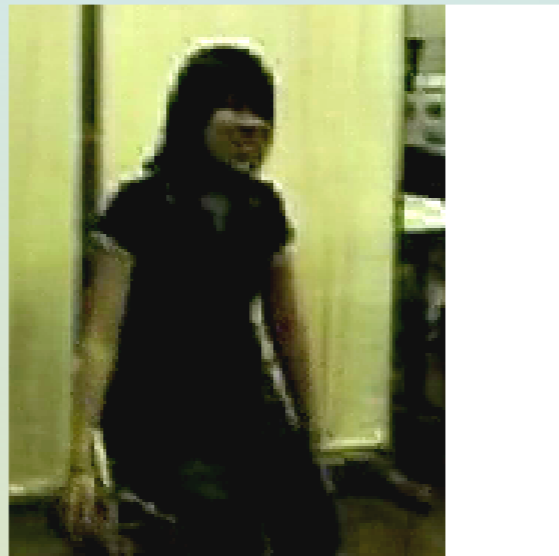
13:46:47



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13:04:33

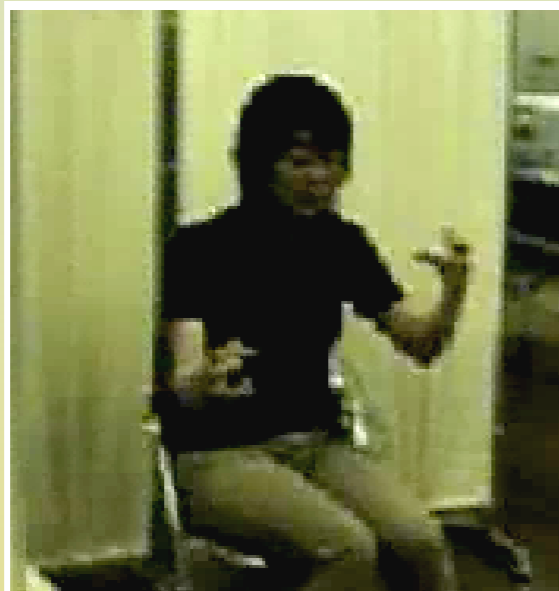
# RF expression, ORF expression



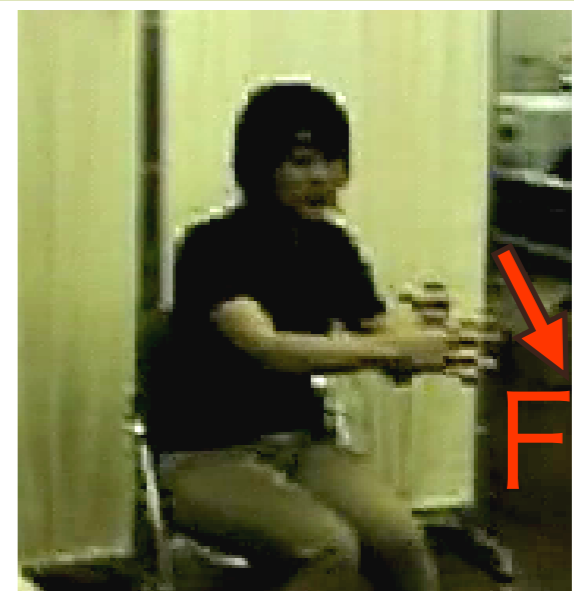
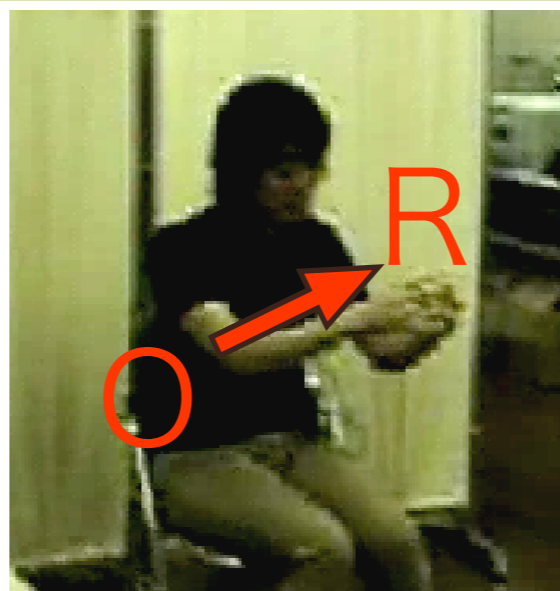
お兄さんの  
The brother LOC,



左にネコ  
left LOC the cat



お兄さんの  
The brother LOC,



左がわにネコ  
left LOC the cat

Did the informant's ORF related to the coincidence of 2 participants?

---

| Informant's ORF | Coincidence of left/right in the picture |   |
|-----------------|--|---|
|                 | +  | - |

---

+

13

4

-

3

3

---

( $\chi^2$ -test,  $p=0.087$ )



If ORF reduces the ambiguity, why not ORF?

- When the holder of the viewpoint is face to face to the speaker...
  - ◆ ORF needs mental rotation.
  - ◆ Relative vs. Intrinsic.
    - ◆ The left/right direction in the relative frame is not coordinate with left/right of the speaker's intrinsic frame.

# Behaviors to reduce the cost of mental rotation.

- ◆ Twist to rotate the body axis.



From the speaker's left/right  
to the viewer's left/right



◆ At you right..

Yeah, this side

# Various interactions which produce ORF expression

- ◆ Intrapersonal gesture interactions:
  - ◆ Simultaneous (gesture with both hands)
  - ◆ Sequential (“rock climbing method”)
- ◆ Interpersonal gesture interactions:
  - ◆ Simultaneous (2 gesture spaces or 1 sharing space, one speaks and the other gestures)
  - ◆ Sequential (the recipient takes over the informant’s sequence, or vice versa)

# Interpersonal speech and gesture interaction



おにいさんの左に、ネコがいる

The informant produces RF.  
The recipient pauses her hands to show other  
relata in the sharing space which reduces the  
ambiguity.



# Summary

- ◆ ORF (Deictic gesture from Origin, via Relatum to Figure) gesture reduces the ambiguity of left/right in the speech.
- ◆ ORF meets difficulty when the speaker and the viewpoint are face to face.
- ◆ Several behaviors can overcome the difficulty.
- ◆ Interpersonal speech and gesture system can reduce the ambiguity of left/right.