

Interaction and communication (5)

Simon Garrod

So Far

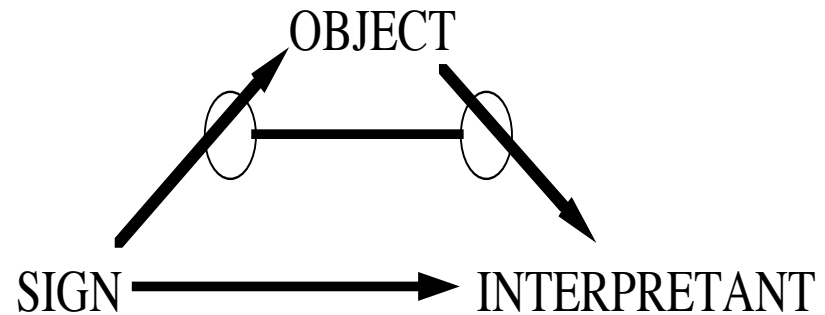
- Explored how interaction affects language processing
- Discussed the interactive alignment account of dialogue
- Shown how interactive alignment affects the evolution of meaning & group communication

Today

- Non-linguistic communication
- General theory of signs
- Pictures and graphical communication
- Role of interaction in communicating with graphical signs

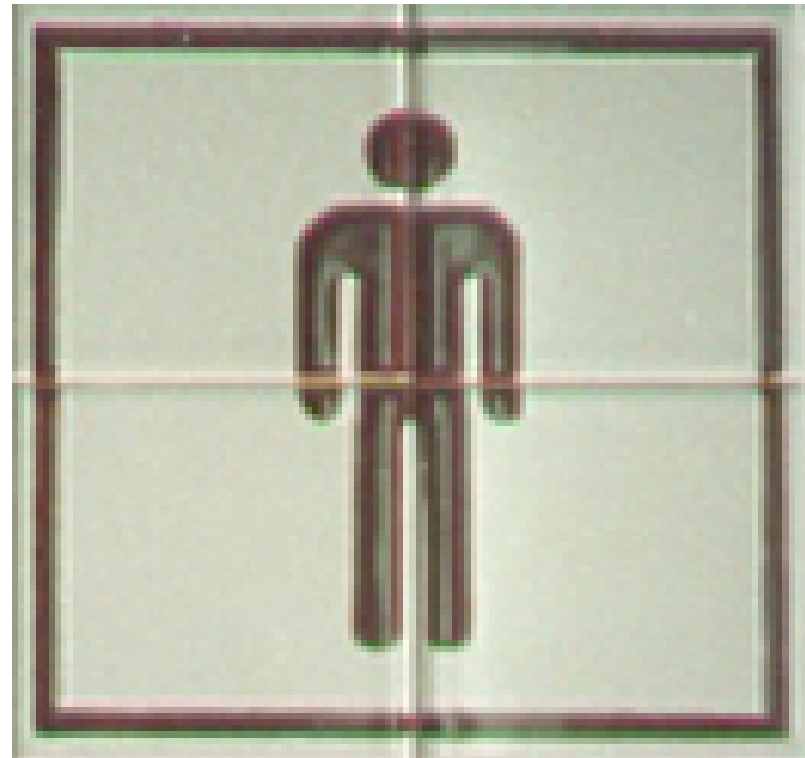
Peirce's Theory of Signs

- Sign
 - Icon, Index, Symbol
- Object
 - What sign stands for
- Interpretant
 - Interpretation of that sign (another sign according to Peirce)



Sign types(1)

- Icon
 - Signifies by being perceived as similar to its object



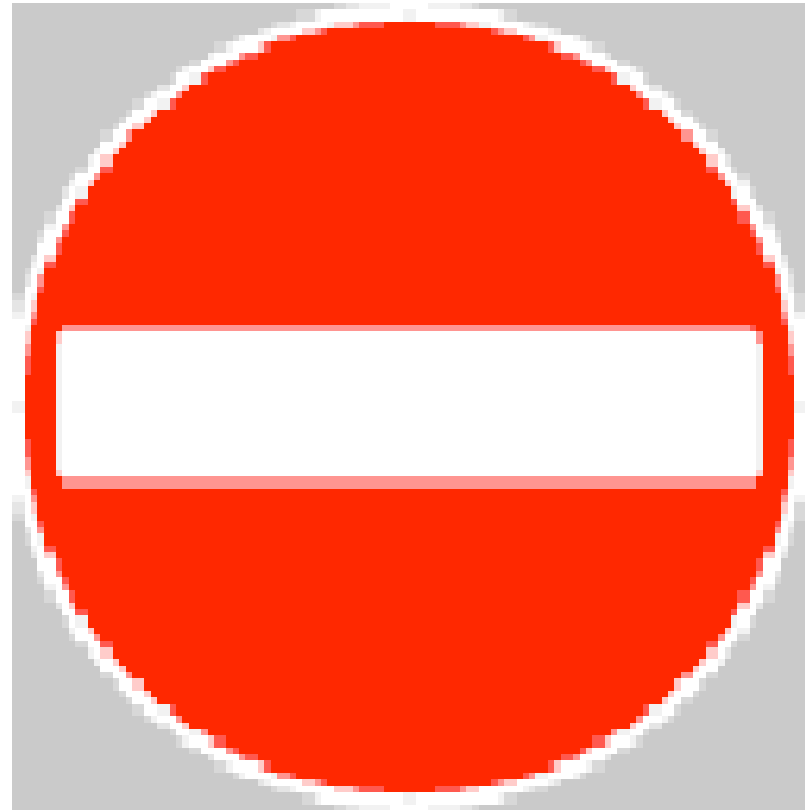
Sign Types (2)

- Index
 - Signifies through causal relation to its object. Pointing automatically alerts attention



Sign Types 3

- Symbol
 - Signifies by habit or convention



Are signs exclusively *iconic*, *indexical*, *symbolic*?




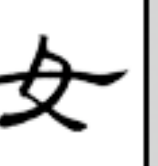
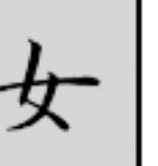


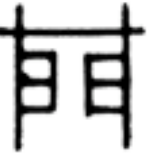
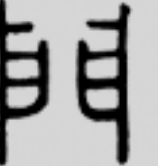

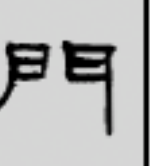
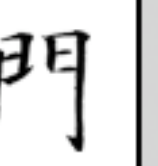
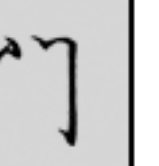

- Language is pure symbolic?
- Sign language is sometimes *symbolic*,
iconic, *indexical*
- Gestures are sometimes *iconic* but
sometimes *indexical* or *symbolic*
- How about graphical signs?
- Where do symbols come from?

Graphical signs and their development

- Infants < 6 months recognize the objects of a picture (e.g., infant's mother)
- But, they sometimes confuse the object with the picture (e.g., sucking a depicted teat on a bottle)
- Toddlers treat pictures as of the *intended* object (i.e., as communicative)

DeLoache (2003) Becoming symbol minded, *TICS*(8,2)

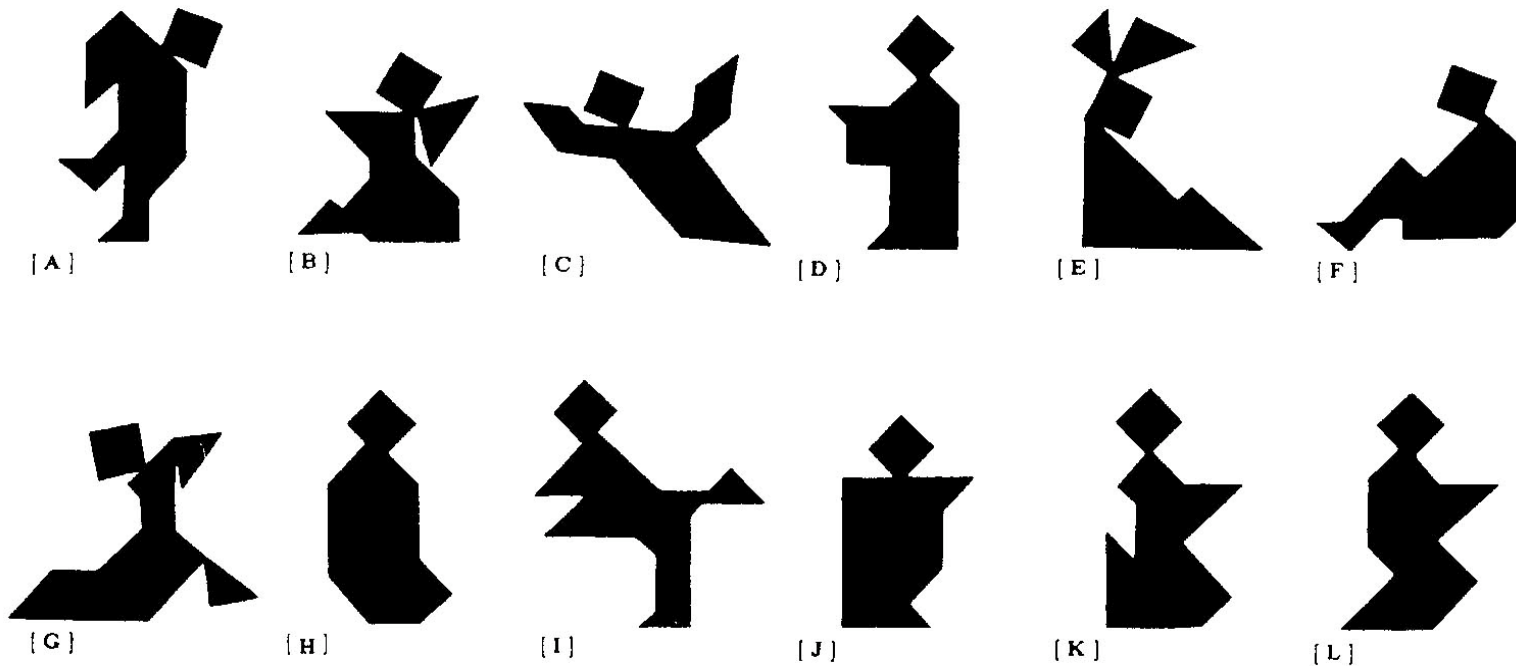
Evolution of graphical symbols?

	TORTOISE-SHELL WRITING	BRONZE INSCRIPTION	SEAL STYLE	ANCIENT SQUARE STYLE	SQUARE STYLE	SEMICURSIVE STYLE	CURSIVE STYLE
WOMAN							
GATE							

Interactive graphical communication?

- Graphical production (e.g., drawing) is normally an isolated activity
- Shared virtual whiteboards support graphical interaction
- How does interactive graphical communication work?
- Is it like monologue or like dialogue?

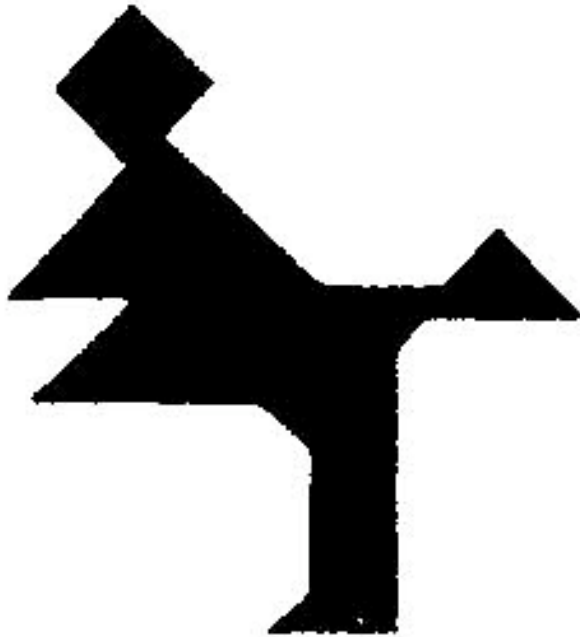
Interactive Verbal Communication



Chinese Tanagram figures used by Clark and Wilkes-Gibbs (1986)

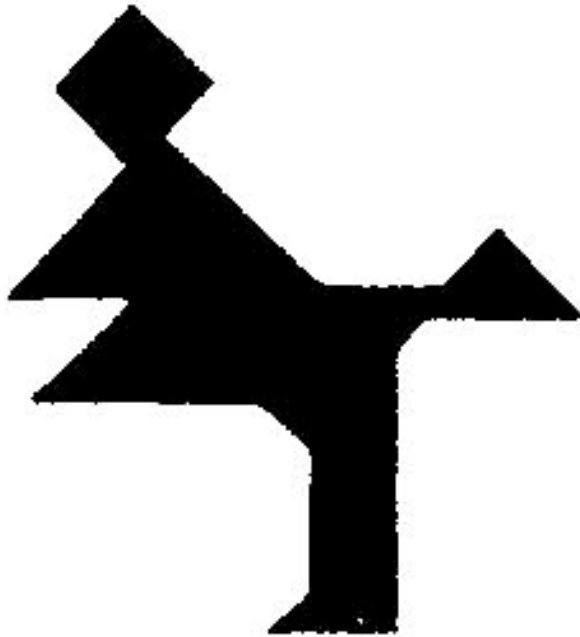
Referring Expressions 1

- 1 All right the next one looks like a person who's ice skating, except they're sticking two arms out in front



[1]

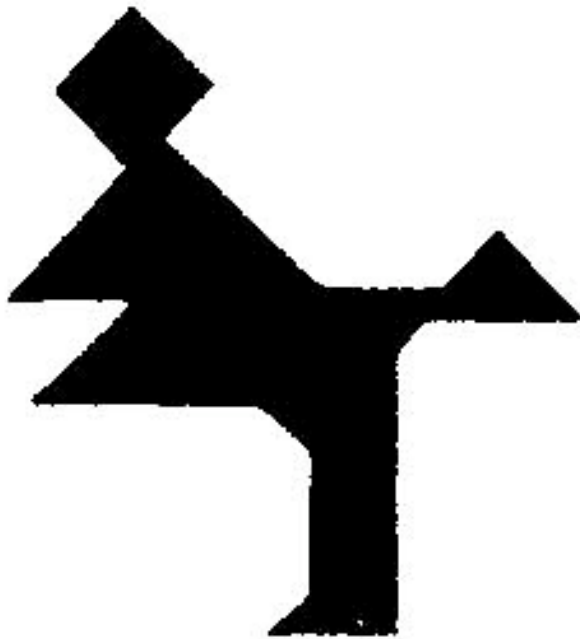
Referring Expressions 1



[1]

- 1 All right the next one looks like a person who's ice skating, except they're sticking two arms out in front
- 2 Um, the next one's the person ice skating that has two arms

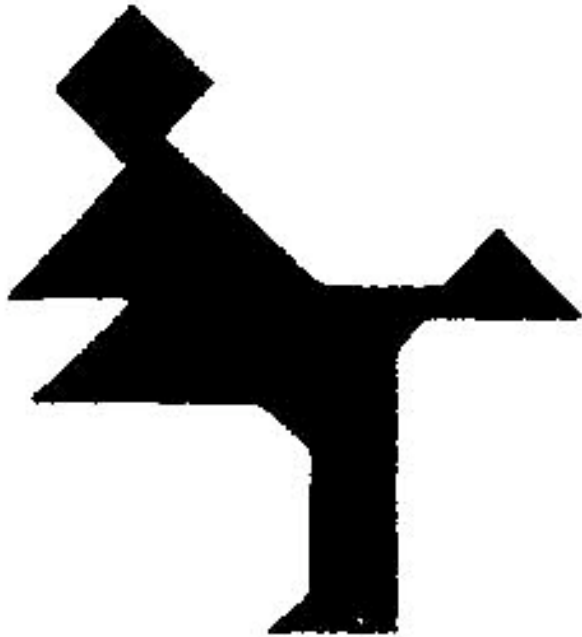
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- 2 Um, the next one's the person ice skating that has two arms
- 3 The third one is the person ice skating, with two arms

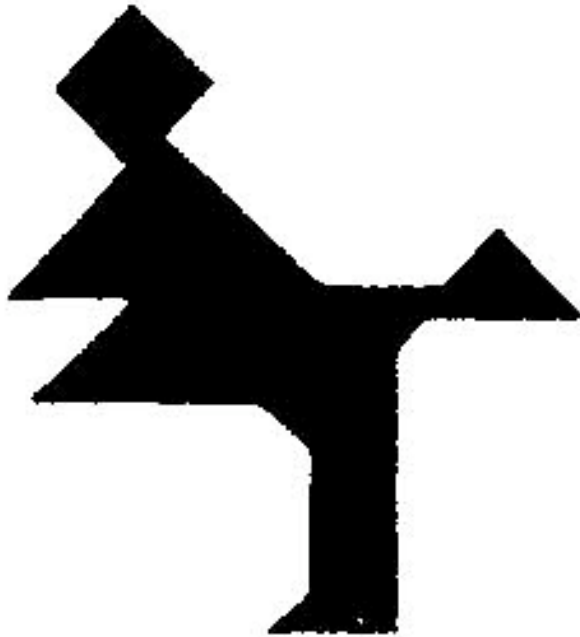
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- 4 The next one's the ice skater

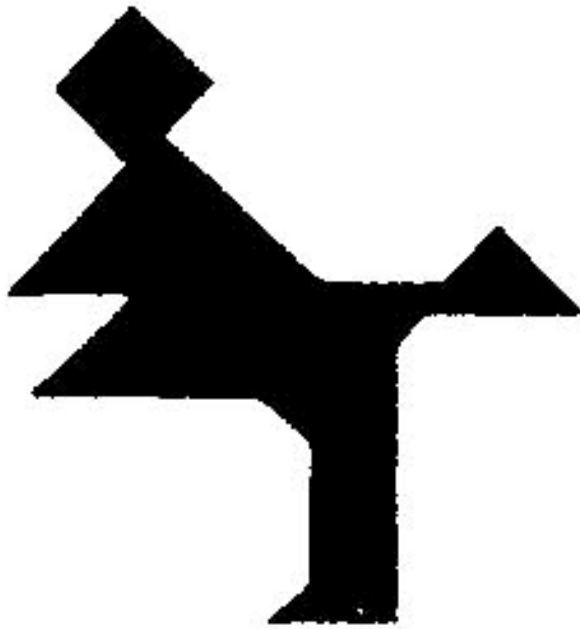
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- 5 The fourth one's the ice skater

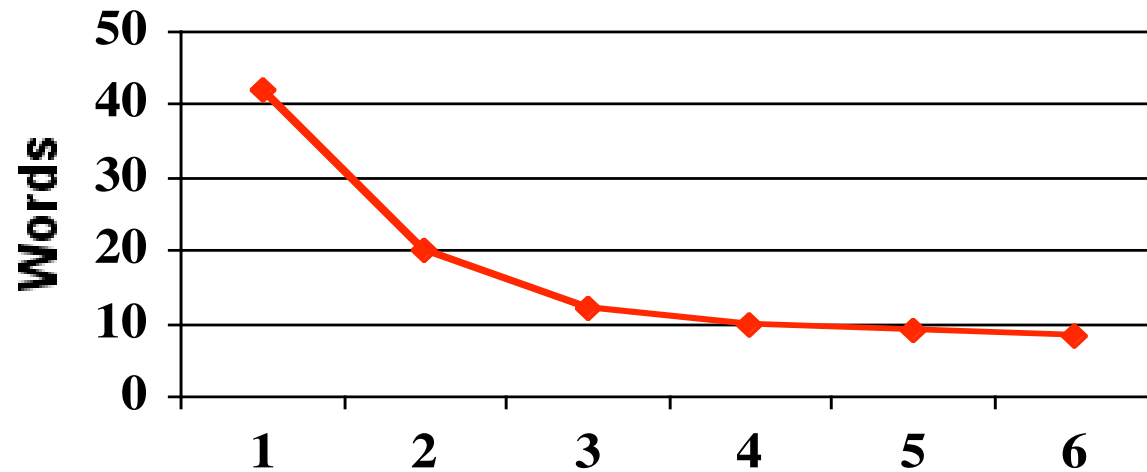
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- 5 The fourth one's the ice skater
- 6 The ice skater

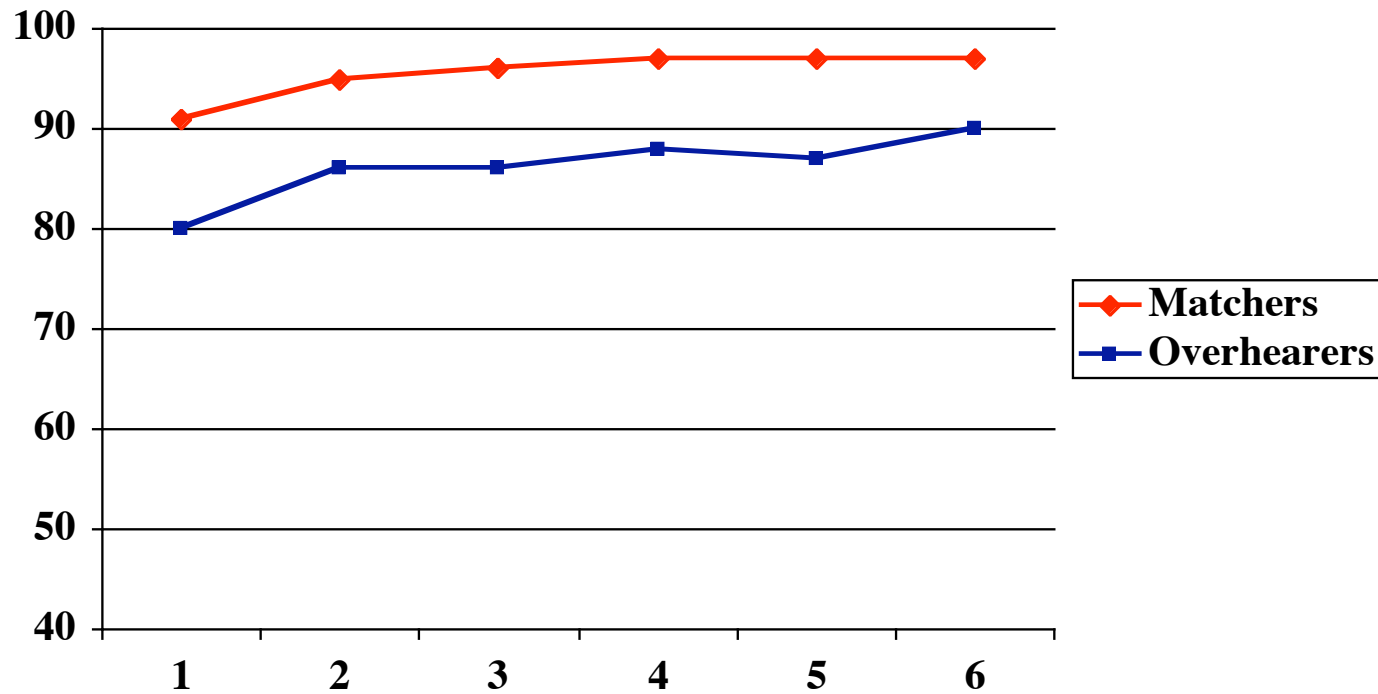
Referring Expressions 2



Drop in complexity of descriptions as interaction proceeds

(Clark & Wilkes-Gibbs, 1986)

Overhearers' Understanding



Overhearers are always poorer at understanding than participants
(Schober & Clark, 1989)

Question

- Graphical communication like interactive verbal communication?
 - Drawer and viewer collaborate to establish consensus.
- Graphical communication like non-interactive verbal communication?
 - Drawer broadcasts information to the viewer.

Hypothesis & Task

- Graphical Referential communication task.
 - Modified version of “Pictionary”.
- Hypothesis: If graphical communication is like interactive communication:
 - Images should become more concise (simpler) with repeated use.
 - Communicators’ images should converge.

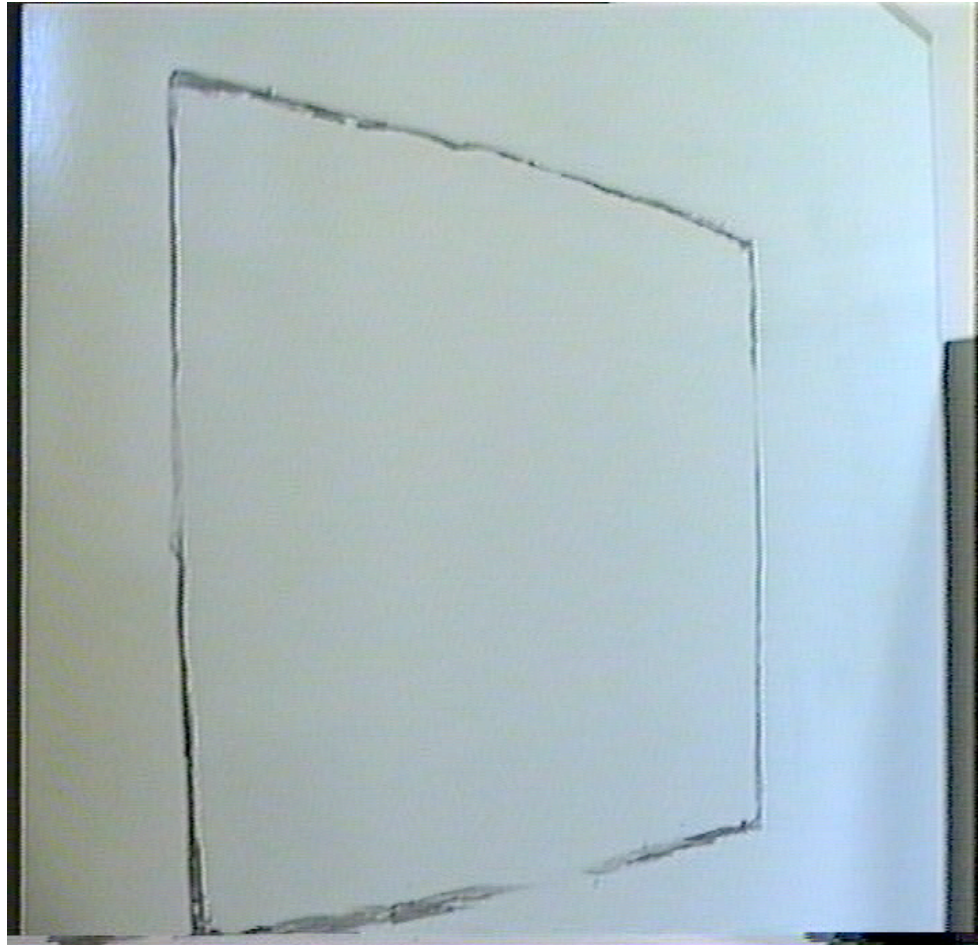
Materials

Places	People	Programmes	Objects	Abstract
Theatre	Robert De Niro	Drama	Television	Loud
Art Gallery	Arnold Schwarzeneger	Soap Opera	Computer Monitor	Homesick
Museum	Clint Eastwood	Cartoon	Microwave	Poverty
Parliament				

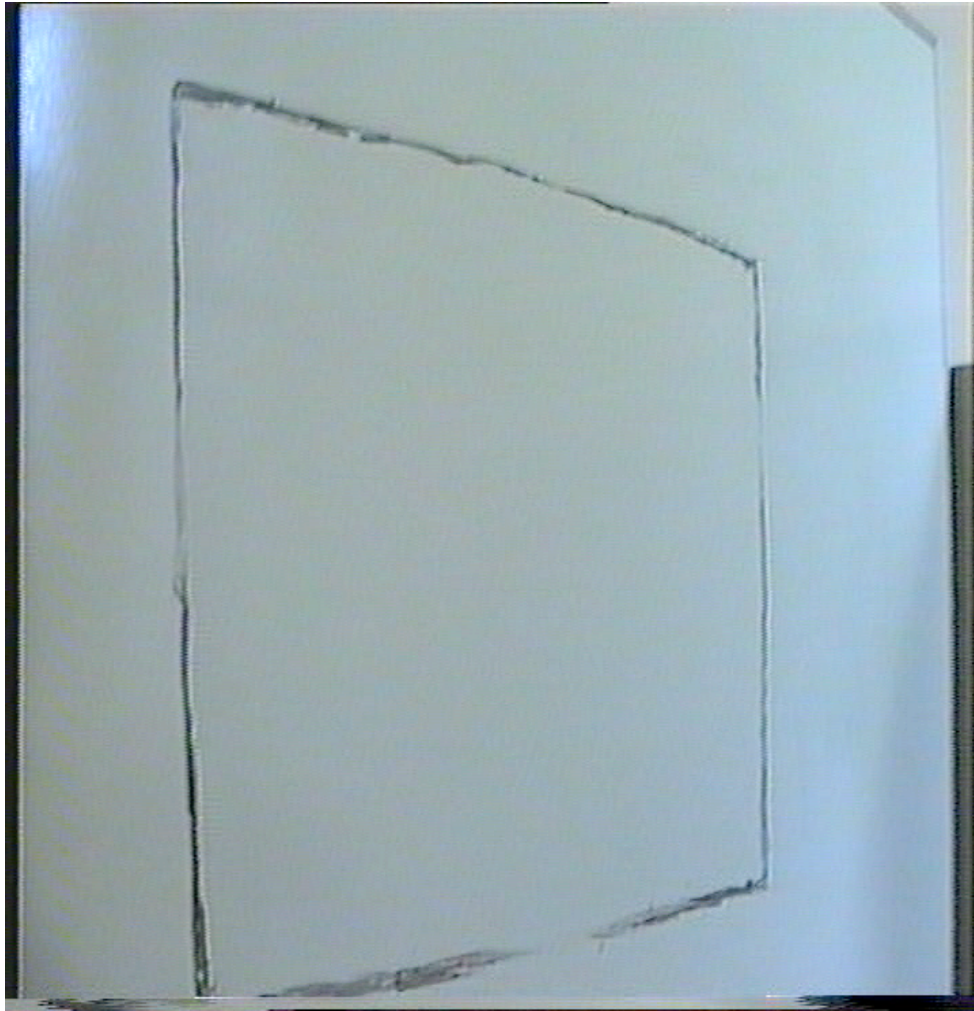
Degrees of interaction

- No interaction
 - One person draws for imaginary audience (**SOLO**)
- Limited interaction (1)
 - One drawer but with addressee feedback(**DM**)
- Limited interaction (2)
 - Two drawers but not co-present(**DD Low**)
- Full interaction
 - Two drawers co-present (**DD High**)

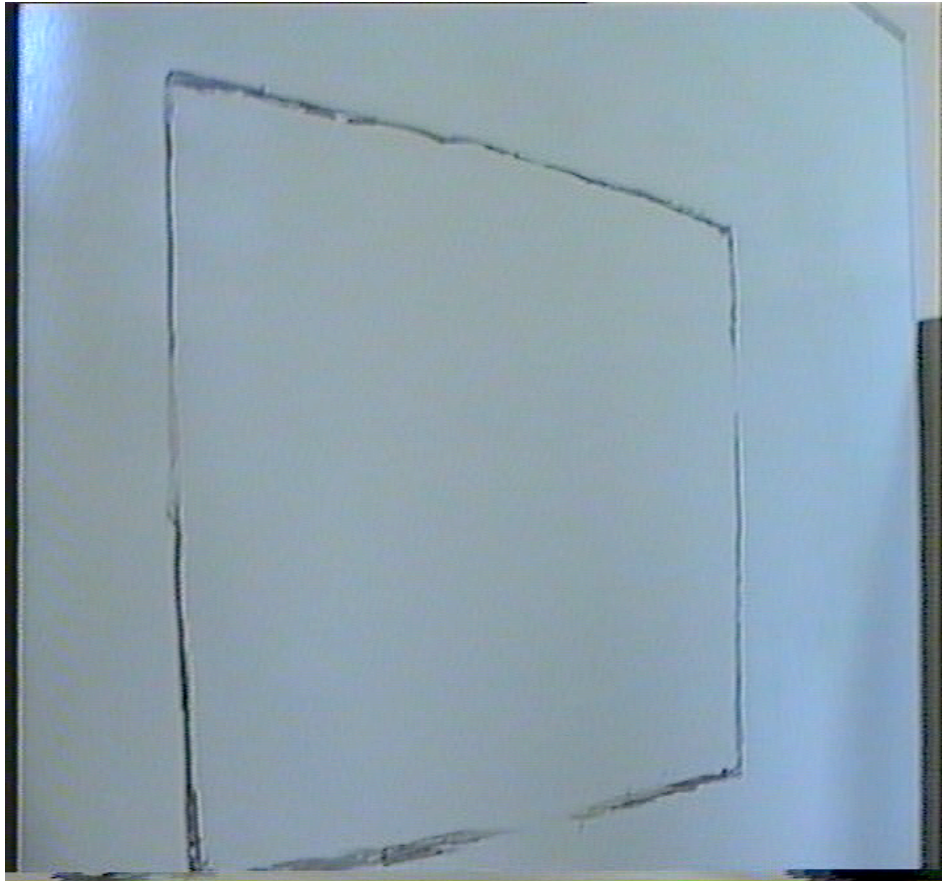
Clint Eastwood 02 (DDLow)



Clint Eastwood 03 (DDLow)

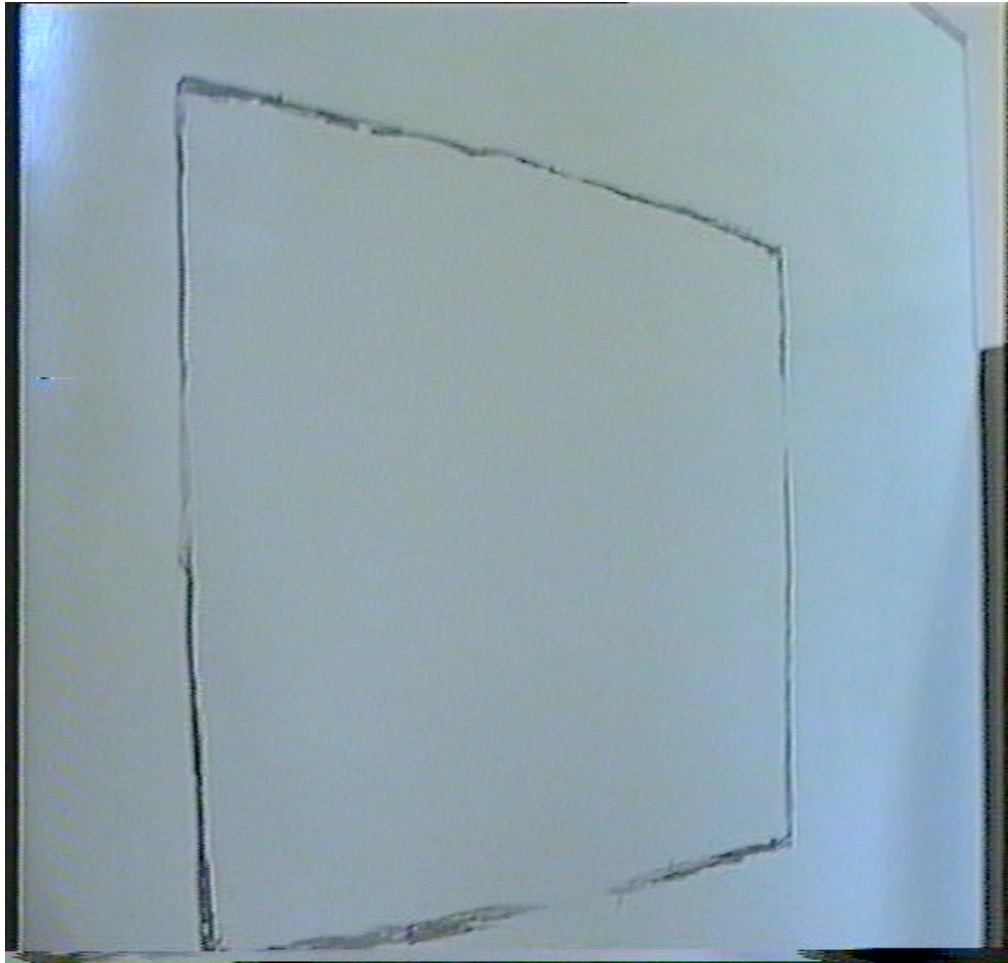


Clint Eastwood 05 (DDLow)

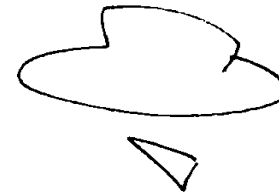


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Clint Eastwood 06 (DDLow)



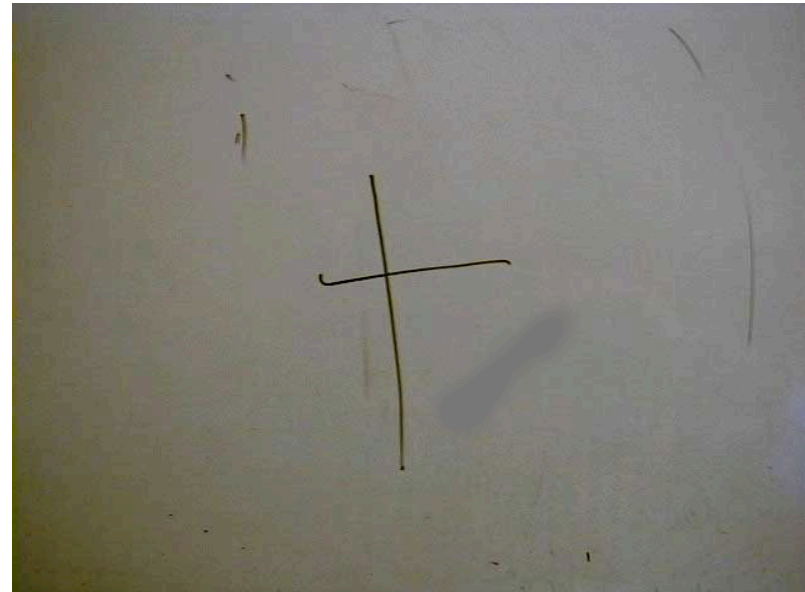
Clint Eastwood (DDLow)



Which item is being depicted?

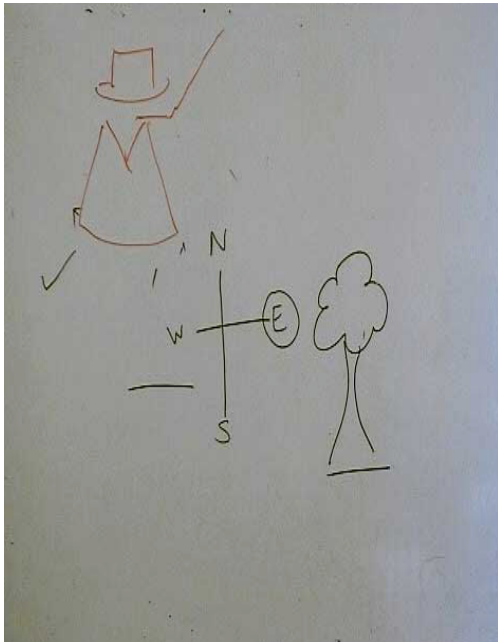
- **ITEMS**

- **Theatre**
- **Art gallery**
- **Museum**
- **Parliament**
- **Robert De Niro**
- **Arnold Schwarzenegger**
- **Clint Eastwood**
- **Drama**
- **Soap opera**
- **Cartoon**
- **Television**
- **Computer monitor**
- **Microwave**
- **Loud**
- **Homesick**
- **Poverty**

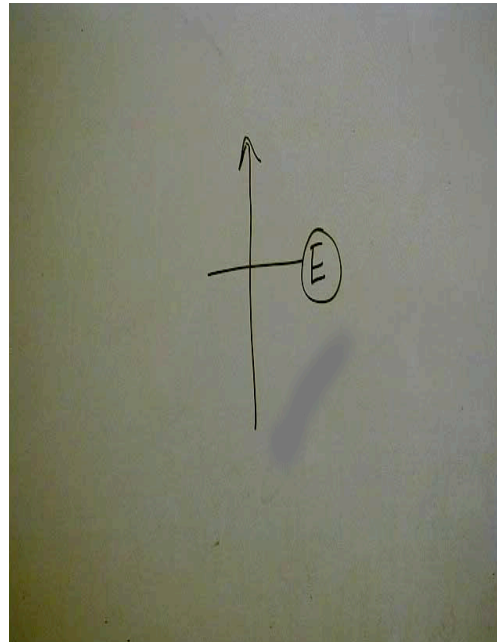


Block 4

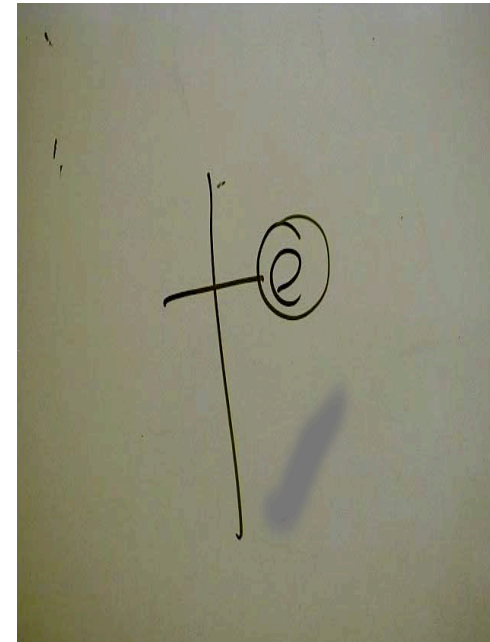
Clint Eastwood.



Block 1



Block 2

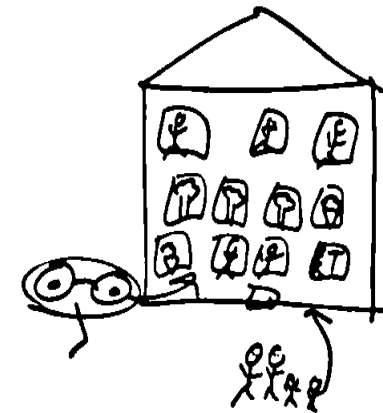
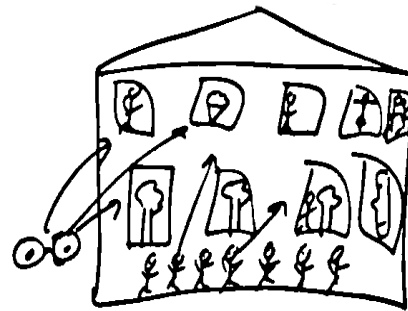


Block
3

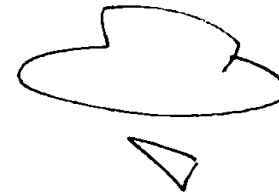
Preliminary Conclusion

- Interactive conditions seem to lead to simpler and more abstract drawings
- What happens in the SOLO condition?

Solo (Art Gallery)



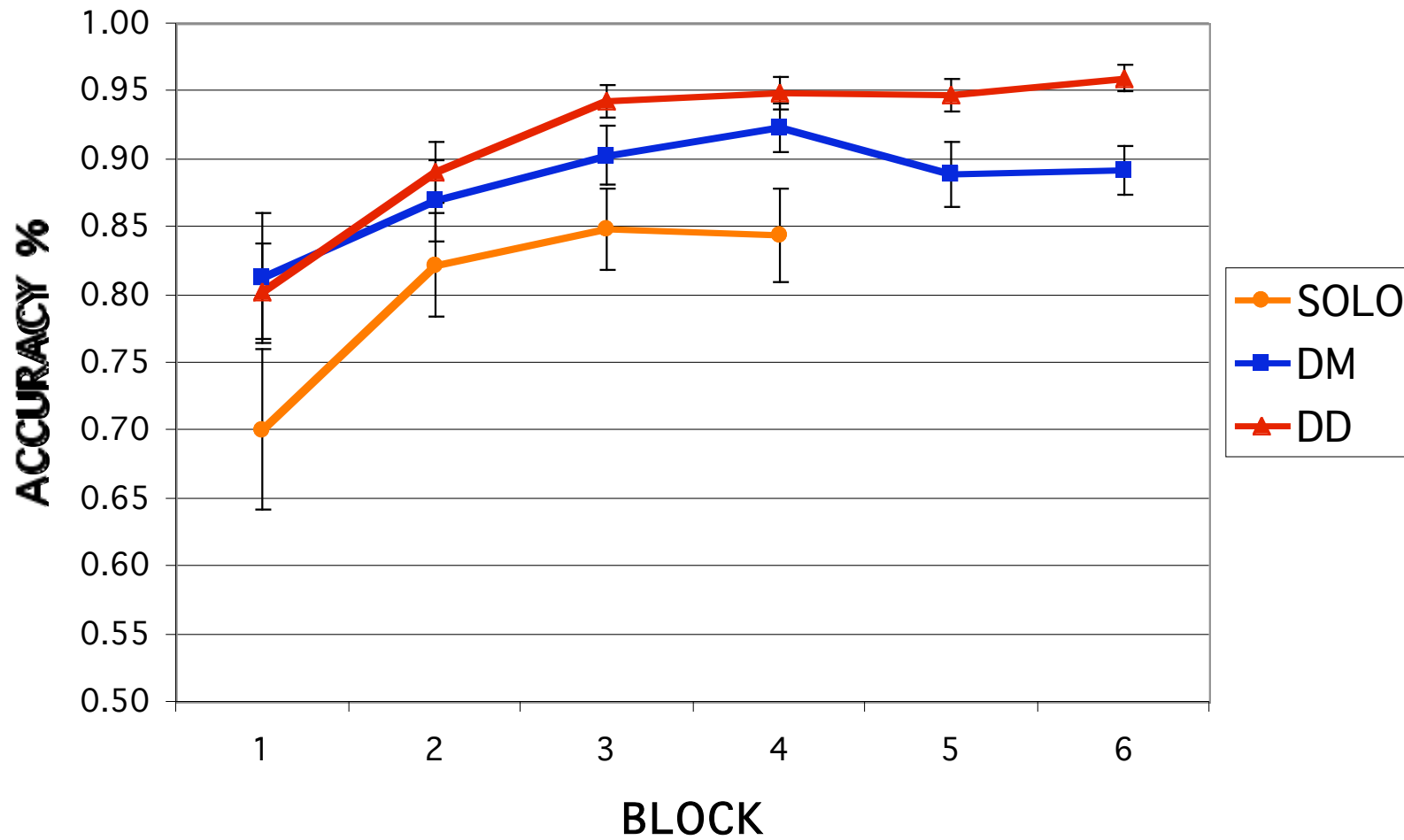
Clint Eastwood (DDLow)



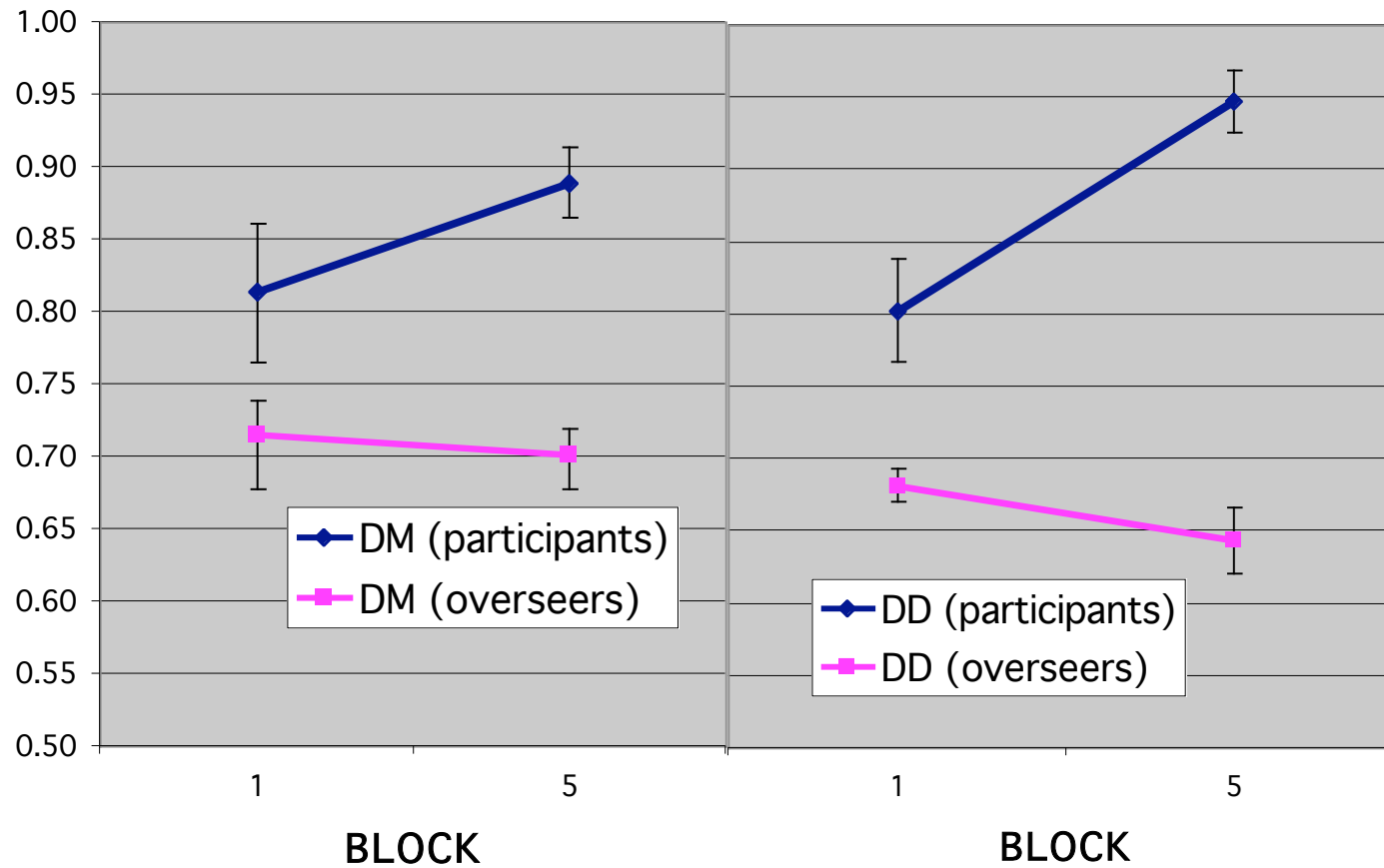
Testing the preliminary conclusions

- Does identification accuracy change with interaction?
- Is there an ‘overseer’ effect?
- Does graphical complexity change with repetition?
- Do drawings converge?

Identification Accuracy



Is there an 'overseer' effect?



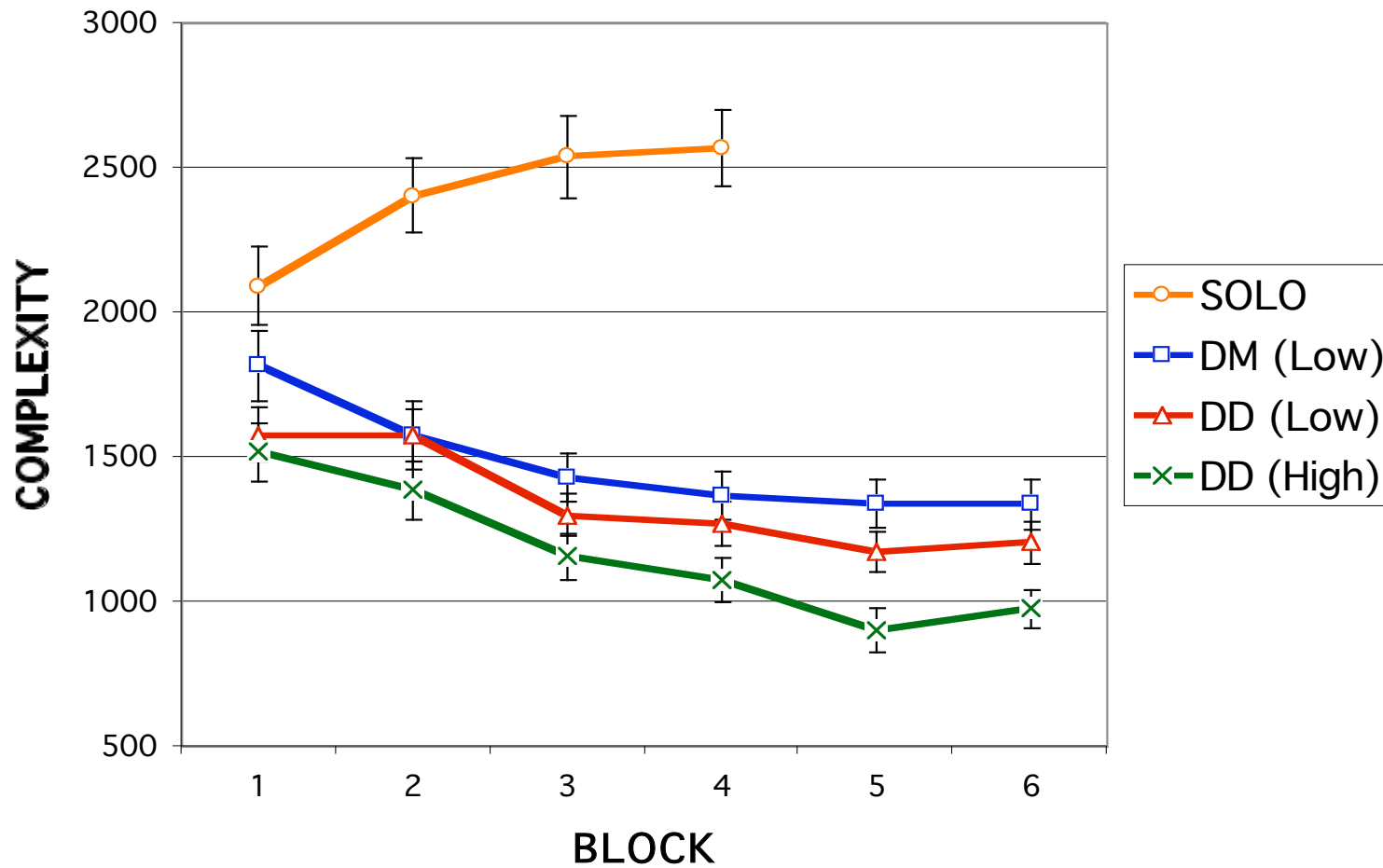
Graphical Complexity

- Perimetric complexity

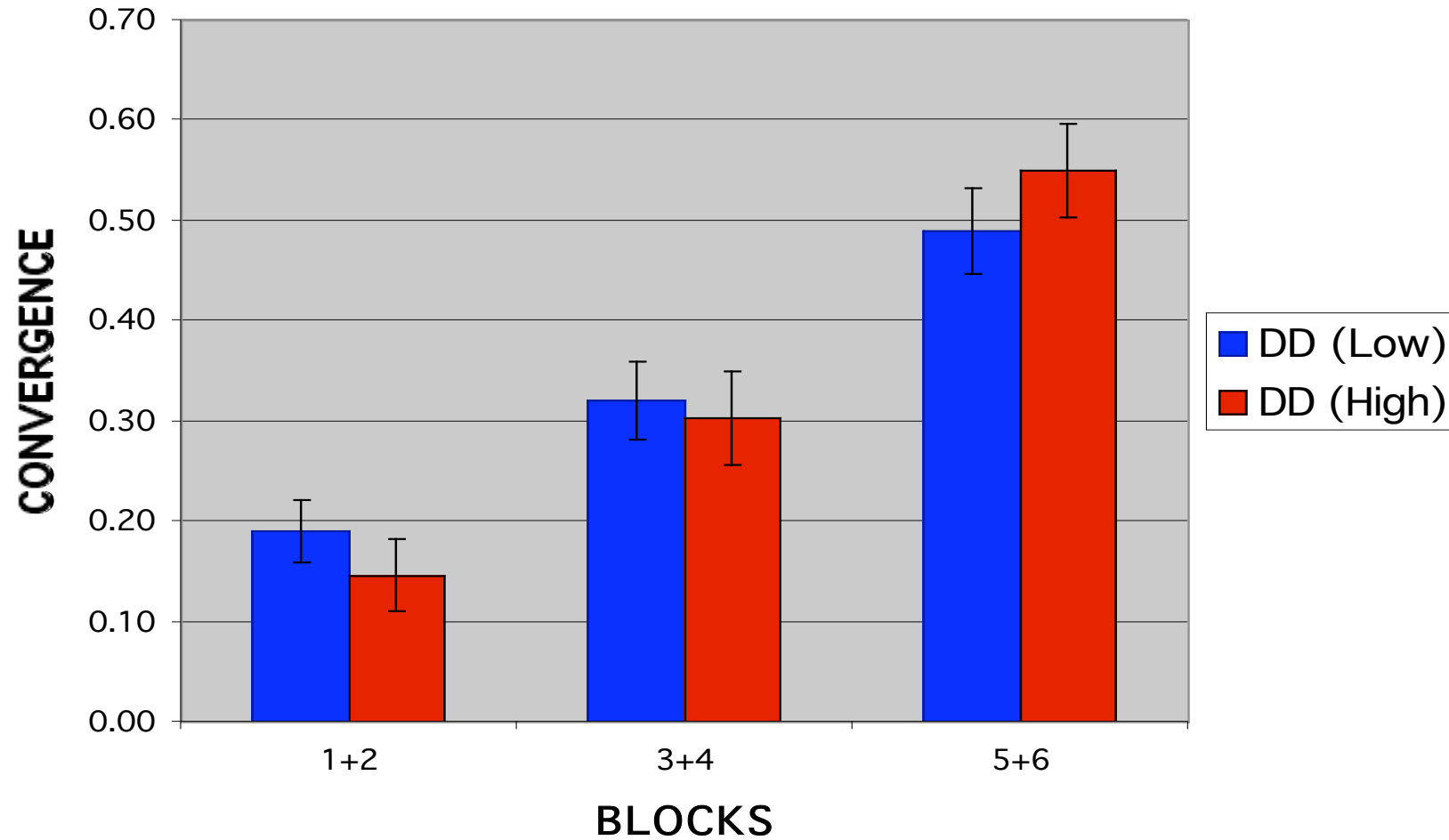
$$\text{Perimetric complexity} = \text{Perimeter}^2 / \text{Ink Area}$$

- Perimetric complexity correlates with perceptual efficiency (Pelli et al., 2002)
 - e.g., identification of letters in different fonts

Perimetric Complexity



Drawings Converge



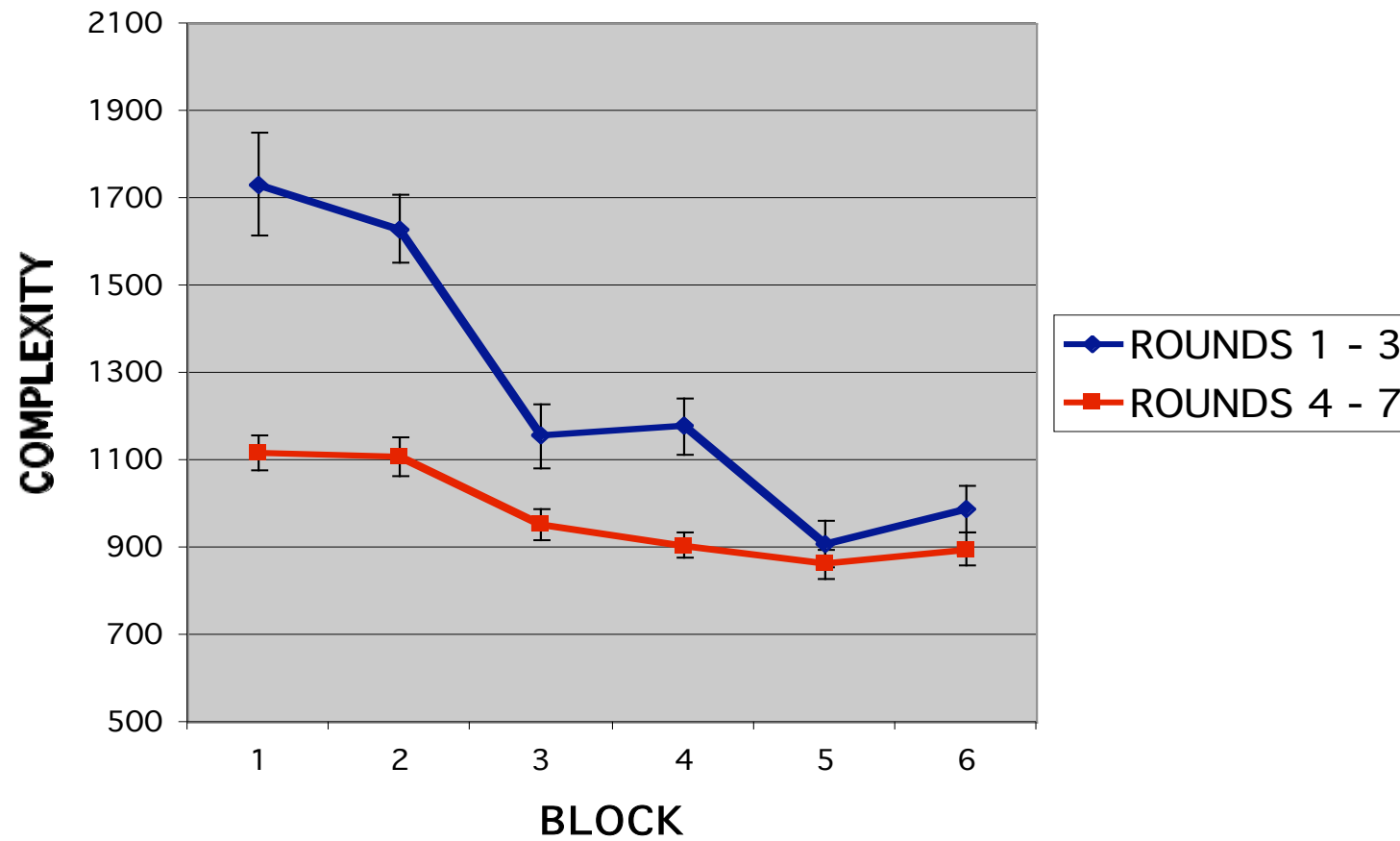
Extending the results on communities

- Communities of speakers converge on a common language (Garrod & Doherty, 1994)
 - Development of cultural conventions
- Do communities of graphical communicators converge?
 - Development of graphical conventions?

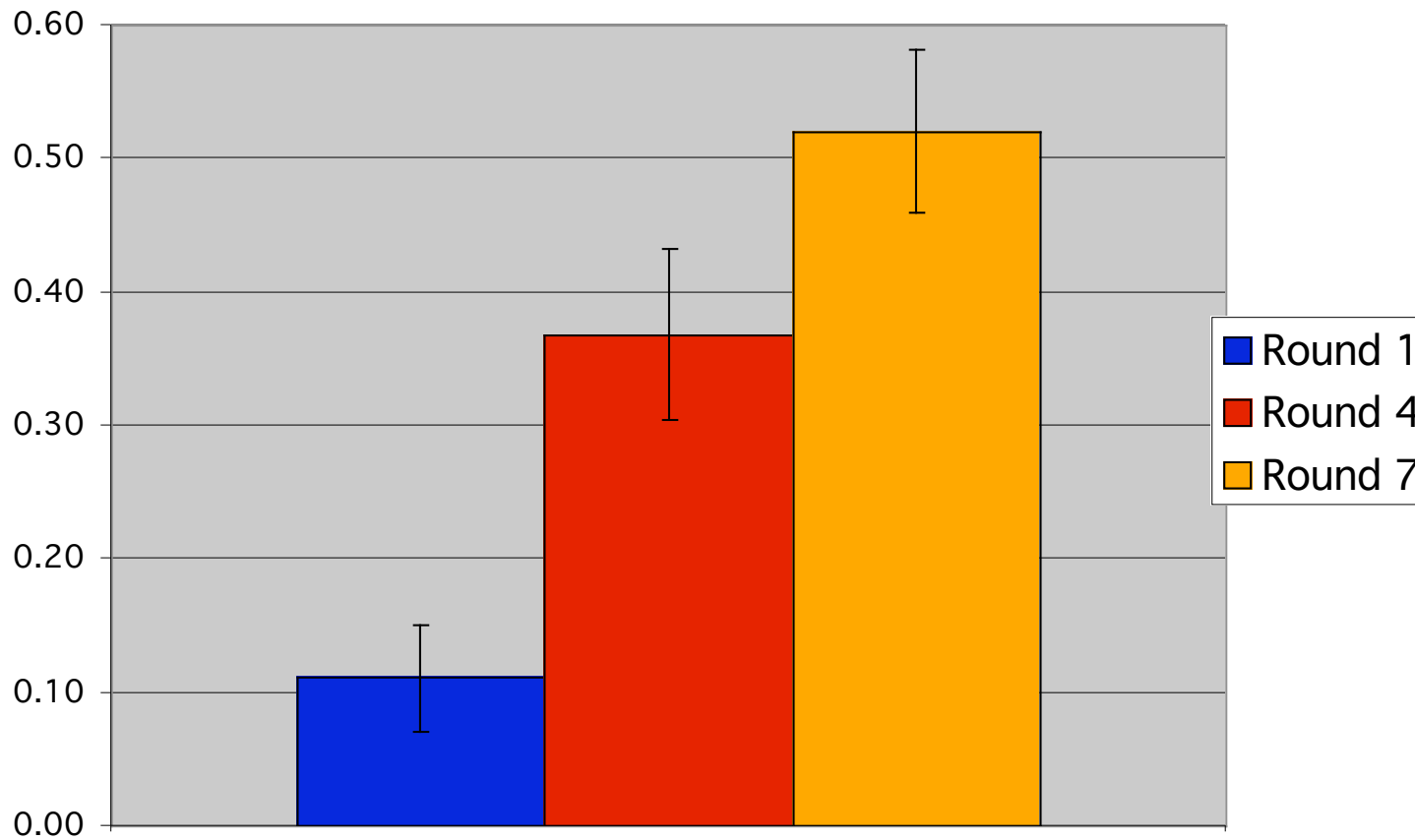
Community Experiment

- 8 players in a High DD pictorial condition
- Each player interacts once with the other 7
- Evidence for graphical conventions
 - Do drawings become simpler each round?
 - Do drawings converge towards the end?

Community Complexity Results



Community convergence at beginning of each round



Conclusions

- Novice graphical communicators quickly become fluent (e.g., ‘pictionary task’)
- Graphical communication is interactive in the same way as verbal communication
 - Pictures become simpler
 - Pictures converge between partners
 - There is an ‘overseer’ effect
 - Communities of graphical communicators converge

Hypothesis

- Through interactive use graphical signs become simpler
- Information is transferred from external sign to internalized representation of sign's meaning
- Transition from *icon*, *index* to *symbol*

Summary

- Signs are complex relationships between the *sign*, *object* and *interpretant*
- Non-linguistic signs can be *iconic*, *indexical* or *symbolic*
- Communication with graphical signs is similar to verbal communication
- Graphical signs evolve from *icons* to *symbols*