

How do conventions emerge in group communication?

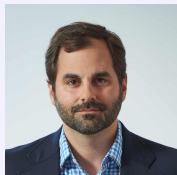
Veronica Boyce

CogSci seminar

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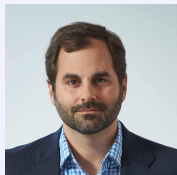
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Communication occurs in many contexts

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to large group to broadcast

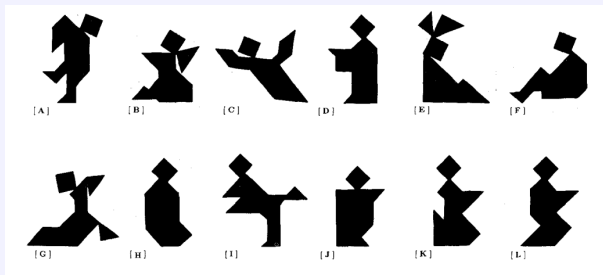
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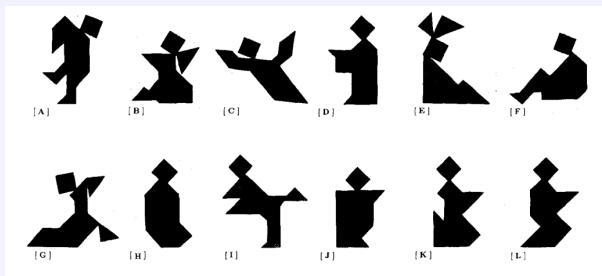
In all cases, need to efficiently establish reference.

Clark & Wilkes-Gibbs 1986: Efficient Reference

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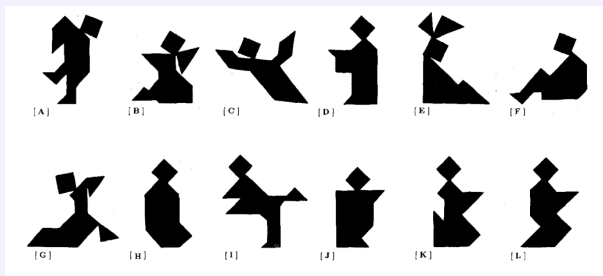


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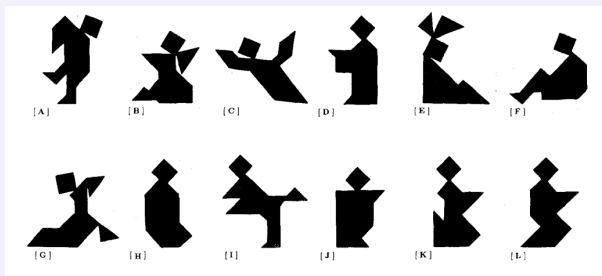
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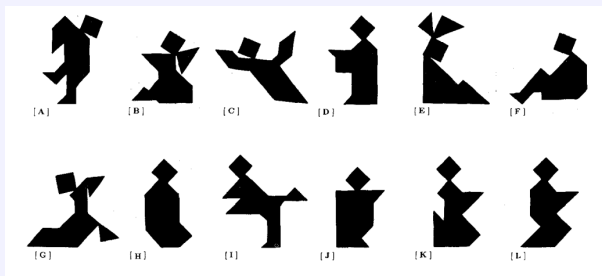
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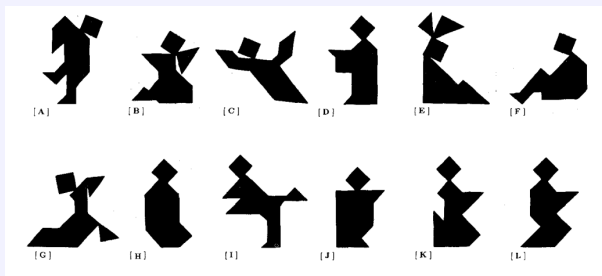
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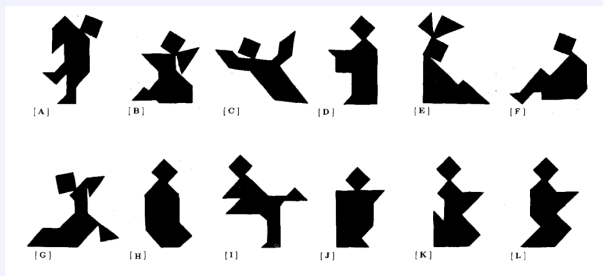
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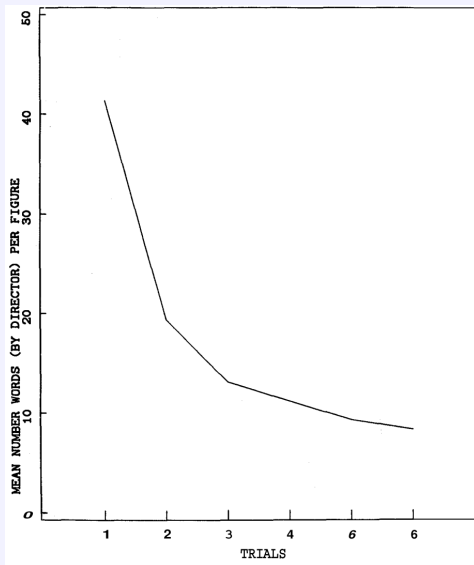
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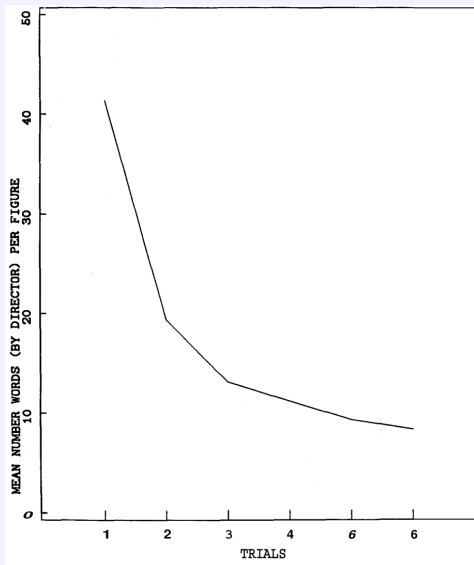


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Clark & Wilkes-Gibbs 1986: Reduction



Clark & Wilkes-Gibbs 1986: Reduction



Ubiquitous phenomenon

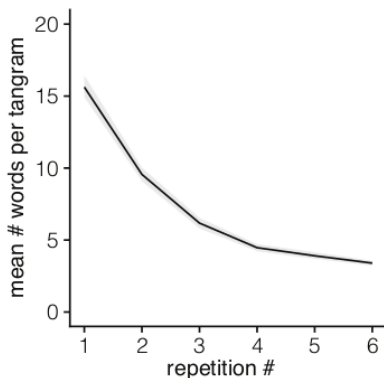
Many explanations:

- Common ground (Clark 1996)
- Recursive mentalistic inference (Goodman & Frank 2016)
- Interactive priming (Garrod & Pickering 2009)

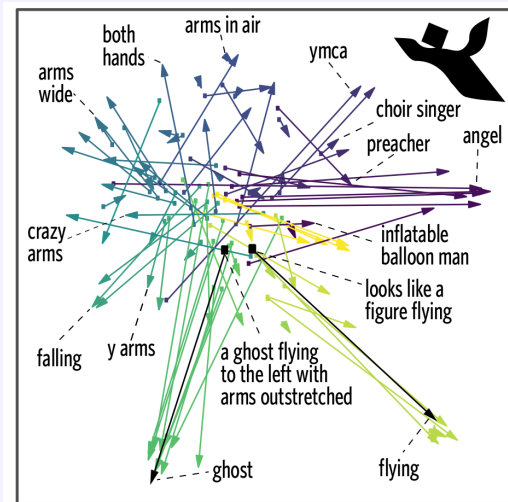
(Won't address today)

Scaling up via web-based experiments

- Cued version with feedback on each trial
- Message with a chat box
- After all exclusions, 83 dyads



Hawkins, Frank, & Goodman 2020: Content Analysis



Semantics converge within and diverge between groups

Dyads are well-studied in this paradigm,...

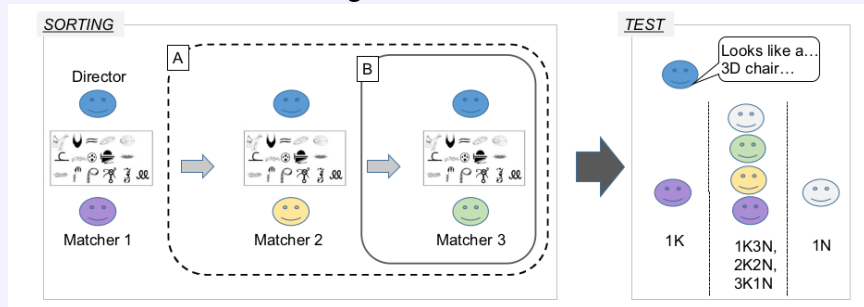
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How does efficient reference work in groups?

Yoon & Brown-Schmidt 2019: Audience design

Speaker trains with some matchers

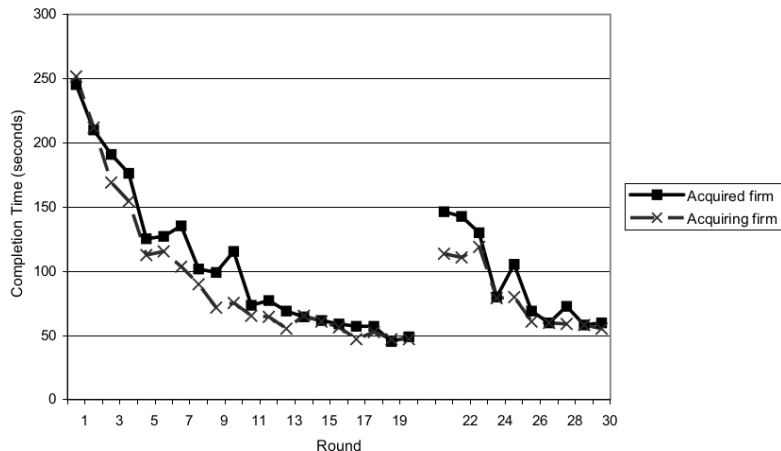
Then talks with knowledgeable and/or naive listeners



Longer, more elaborated & disfluent utterances with mixed or naive listeners

Weber & Camerer 2003: Adversarially trained listeners

Figure 2 Average Completion Times (11 Merger Sessions)



Hard to accommodate listeners with different concepts

FYP: Communication in small groups

Compare groups of 2/3/4 communicators
Follow paradigm of Hawkins et al. (2020)

- Rotate who the speaker is
- Different feedback


Questions we can address:


- speed of convergence by group size
- managing multiple listeners
- use convention v new description
- where/when do conventions originate


Empirica (Almaatouq et al 2020)

Virtual Lab platform for real-time interactive experiments

Round 1 / 6 > Target 1 / 12

 Laju (You)

 Repi (Listener)













 Minu (Listener)

Timer
01:43

Score
\$0.00

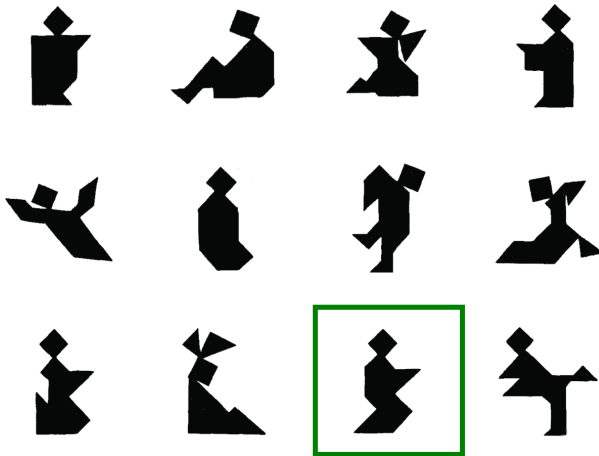
No messages yet...

You are the speaker. Please describe the picture in the box to the other players.

Experiment Framework

Your selection is CORRECT!



Bonus: 4 points

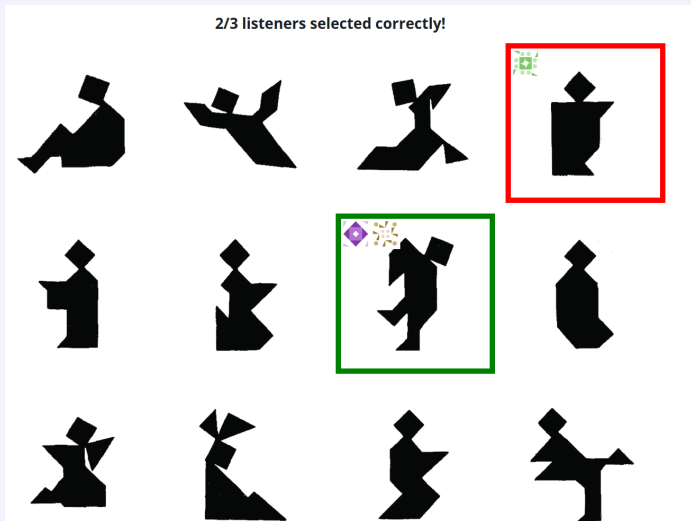
Experiment Framework

Whoops, your selection was incorrect.



Bonus: 0 points

Experiment Framework



Bonus: Average of listeners = $(2/3) * 4$ points

Recruitment

Goal: 20 games in each of 2/3/4-player conditions
Each game has 6 blocks of 12 tangrams

Recruitment

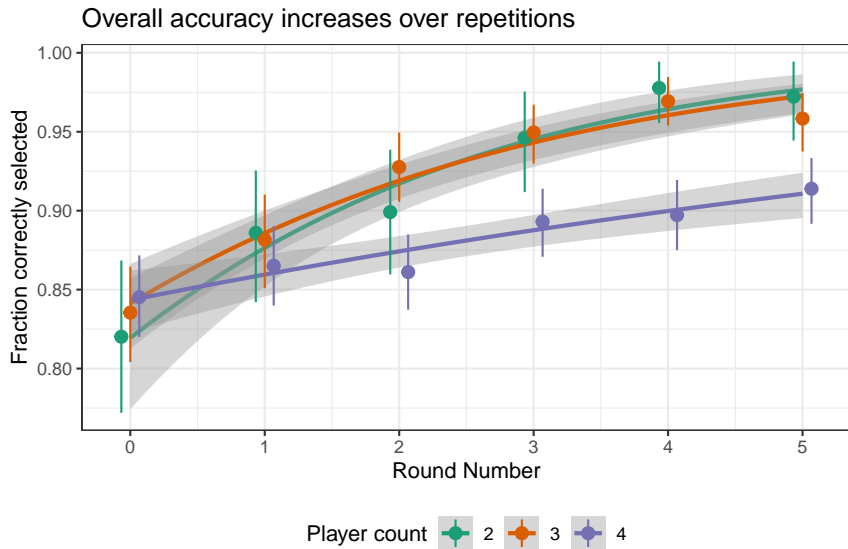
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Actual recruitment (over 3 days):

- 15 2-player games (+ 4 partial)
- 18 3-player games (+ 2 partial)
- 20 4-player games (+ 1 partial)

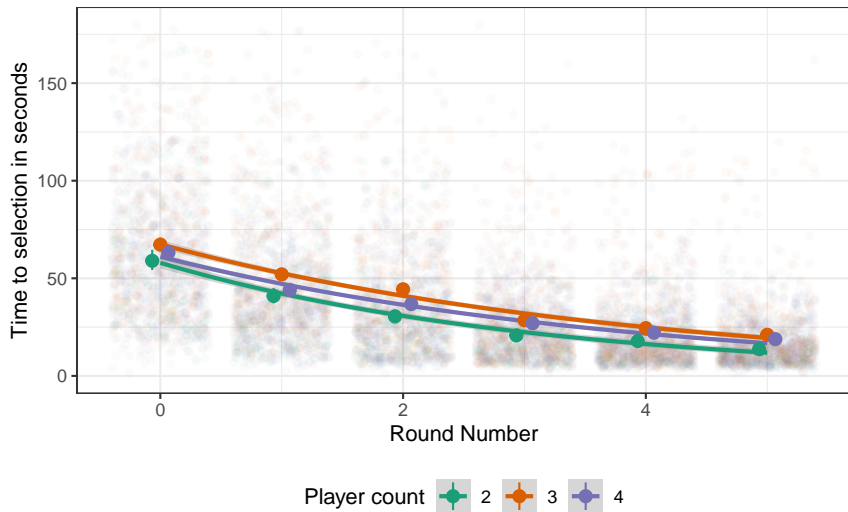
Include all complete blocks

Results: Accuracy is high and increasing

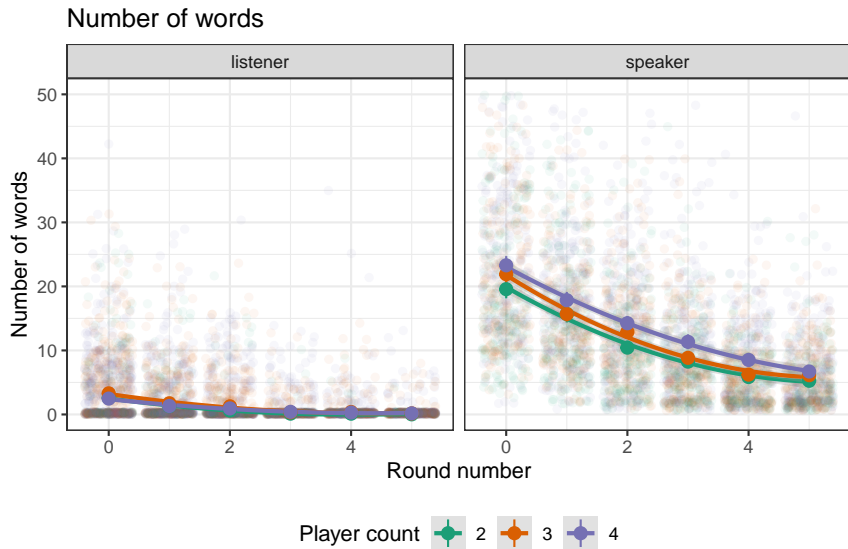


Results: Faster in later rounds

People choose faster in later rounds



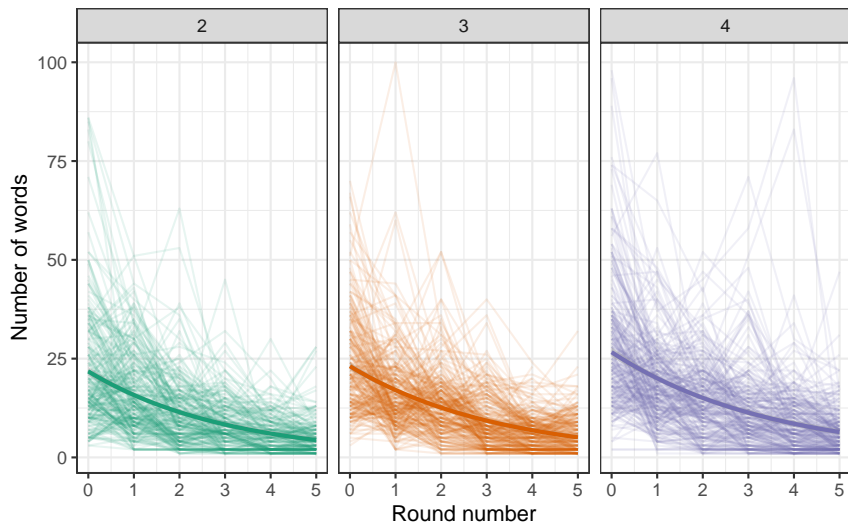
Results: Reduction in words over time



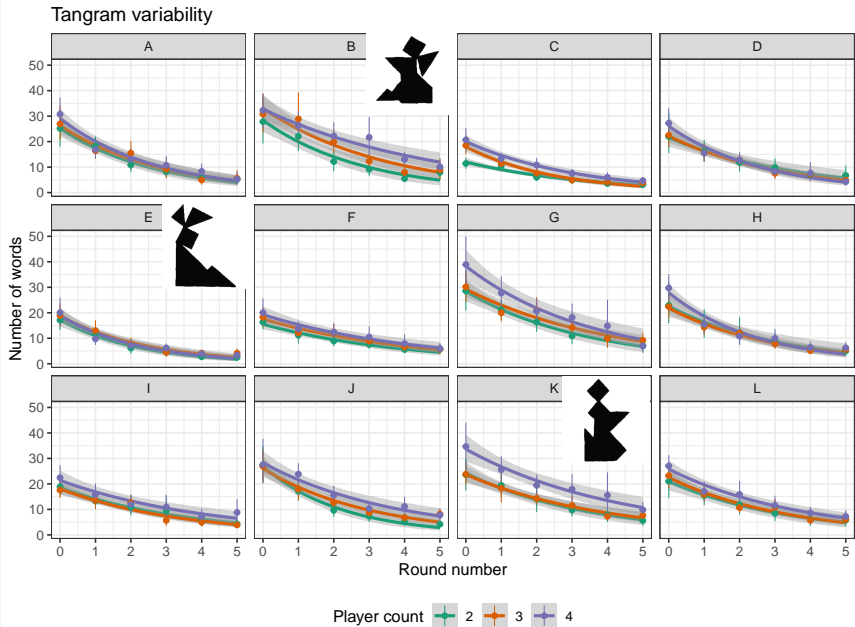
Results: Variability in reduction rate

Most groups/tangrams reduce gradually

Words from speaker per tangram



Results: Tangrams vary in nameability

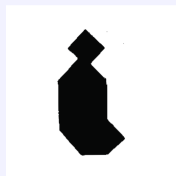


Bayesian model to allow for correlated variability

- Block: -3.22 words [-4.95, -1.55]
- Player count: 1.93 words [-0.15, 4.02]
- Speaker choosing wrong on the previous block: 4.15 words [2.54, 5.79]

Example: iBaby

- 1 A(S): Looks like a letter 'i'
C: does it look like with its hand out or not
B: ^
A(S): no hand it is just a head and a body.
C: oke
A(S): more like a baby that has been swaddled in a blanket
- 2 B(S): swaddled baby
B(S): l
B(S): i
- 3 C(S): the baby i
- 4 D(S): baby swaddled, looks like an i
- 5 A(S): swaddled baby
- 6 B(S): iBaby

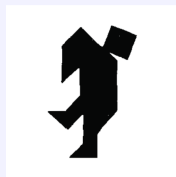


Example: Skydiving ghost superman

- ① A(S):flying man
A(S): like superman
A(S): hands in the air
A(S): like skydiving
- ② B(S): the diver with no legs
A: ok
- ③ C(S): This one looks like a ghost to me, but you called it
superman or skydiver
A: ok no legs?
C(S): Correct
A: ok
- ④ A(S): ghost, superman, skydiver
- ⑤ B(S): sky diver, ghost
A: ok
- ⑥ C(S): Skydiving ghost superman



Example: Karate kid



① A(S): Similar to the karate kid movie

A(S): the crane kick

B: Haha! Does it look like they have dangly sleeves!

C: I don't know that one.

A(S): yes

D: yes i see, thats a good explanation.

Example: Lack of shorthand



- ① A(S):Diamond on top. Body with no real arms or legs. The body is shaped like a boot with the diamond on top.
C: Is the boot pointed left or right?
- ② B(S): diamond on top, large body beneath it. Left is a straight line all the way down, small variations on the right to the main body
- ③ C(S): Diamond in center on top. Left side straight, right side carved out like a vase.
- ④ D(S): Diamond head, flat topped body, straight on the left side with two triangles pointing out on the left
D(S): *on the right
- ⑤ A(S): Diamond on top. Left side is straight, right side is obstructed, looks like a boot
B: what do you mean by obstructed?
A(S): The left side of the body is right, right side has bents in it
- ⑥ B(S): Diamond on top of a long large body/rectangle. Left side is complete, right side has bits missing

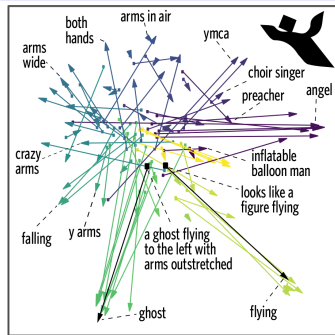
Example: Meta doesn't always help



- 1 ...A(S): yes, the legs are like a zig zag
C: CODE name ZIGZAG
A(S): There are no legs upwards
- 2 B(S): okay so similar to begger guy but no foot pointing up
B(S): its like a zigzag
B(S): i forgot the code name
D: zigzag yea
A: The one standing with knees bent
B(S): yeah
B(S): standing
C: Yeah zigzag
- 3 C(S): The begger with no foot coming out from the left
B: zigzag
C(S): zigzag it is
C(S): sorry i forgot
- 4 D(S): zigzag
- 5 A(S): zigzag
- 6 B(S): beggar guy
B(S): zigzag

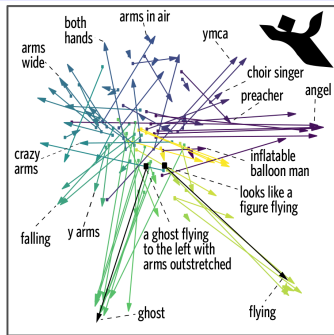
Future analyses: Semantics

- Convergence by group size
- Accuracy & convergence
- Geometric v metaphorical language
- Where/when are (atypical) concepts introduced?



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Online implementation makes iterations, variations easy

Comments, Questions?

Looking for feedback on

- Analyses
- Future data sets