

Word learning

- How do children learn which word maps onto which meaning?
- Early view: co-occurrence patterns.
- Problems: Parents often talk about things not (yet) present.
 - Go get your coat!
 - Do you want some lunch?
 - Let's go see grandma!
 - Time for your bath!

Learning words

- Quine's problem of Indeterminacy of Reference
 - Word-to-world mapping is underdetermined



Another example of the problem

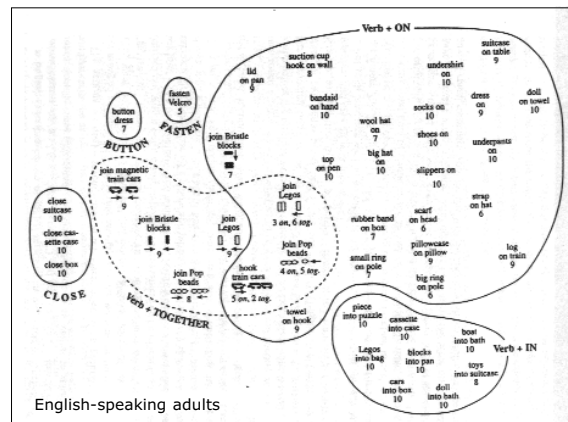
- Even if a parent introduces something in multiple ways, combined with pointing, it is still underdetermined.
 - “Look at the kitty! It's a nice kitty isn't it? Do you want to pet the kitty?”
- Kitty could mean:
 - Animal or Mammal
 - A subspecies of cat, or an individual cat
 - Its coat of fur
 - Its tufted ear
 - Tail
- Something needs to constrain the possibilities.

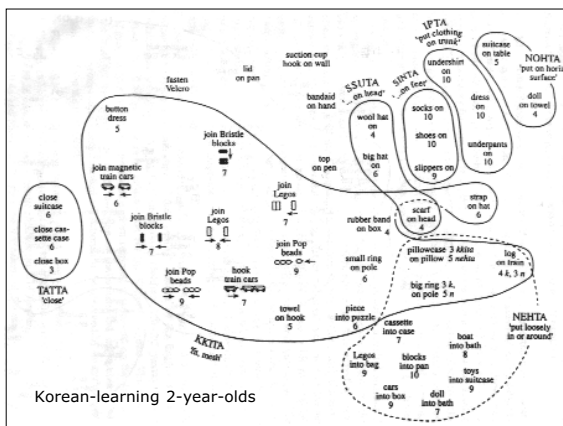
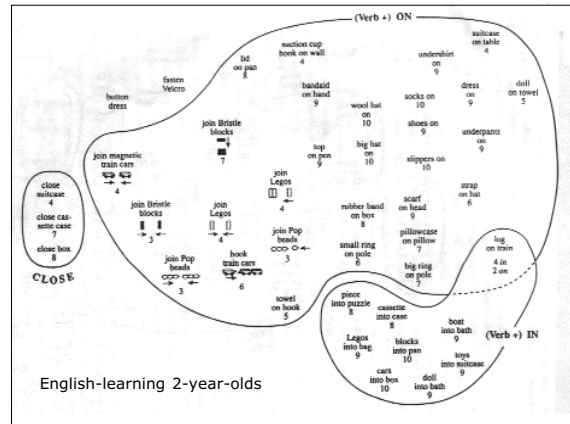
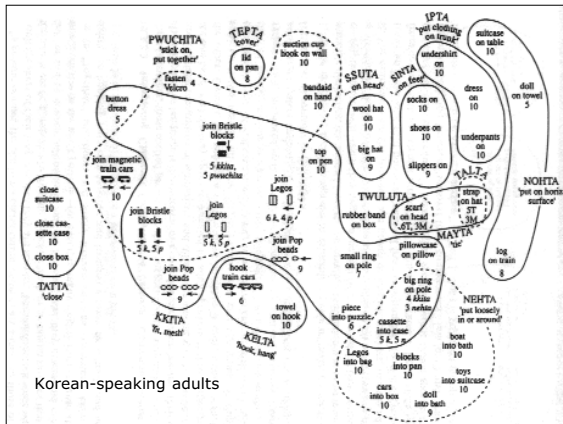
PROBLEM 1

- Inductive problem
 - Potentially wide range of hypotheses

PROBLEM 2

- Mapping problem
 - Cross-linguistic variation
 - Ex: Melissa Bowerman found differences between English & Korean





Cross-linguistic differences

- These cross-linguistic differences mean that the meaning isn't necessary.

PROBLEM 3

- Speed of learning
- Some estimate:
 - 10,000 words by 1st grade
 - 5.5 per day from 1.5 to 6 yrs
 - 40,000 words by 5th grade
 - 20.5 per day from 1st to 5th grade

Four approaches to solving the problem

- Principles & Constraint theories
- Syntactic bootstrapping
- Social-pragmatic accounts
- Associationist views
- Emergentist coalition

Constraints

- Whole object (or object scope)
 - Words refer to whole objects rather than an object part or attributes (such as color and size)
 - Markman 1987
- Taxonomic
 - Words refer to objects of like kind, not like themes
 - Markman and Hutchinson (1984)
- Mutual exclusivity
 - each object will have only one label.
 - Markman 1989

Evidence for the whole object principle

- If an object doesn't have a name, children attach a new label to it; if it does, they assign label to a part.
 - Markman and Wachtel (1988)
- Attach labels to objects over interesting “non-object” substance.
 - Woodward (1992)
- Children have more names for objects, and nouns learned faster
 - Gentner (1982) vs. Tardiff
- Children sometimes use adjectives as if they were nouns (hot for fire, pretty for jewelry)...

Criticisms of whole-object principle

- Only roughly 40% of early words are object labels.
- Children learning Chinese, Japanese, and Korean learn verbs and nouns simultaneously
- Perhaps not a bias towards nouns, but more ostensive teaching of nouns in middle-class America?

Evidence for the taxonomic assumption

- In the absence of a label, children generally focus on thematic relations.



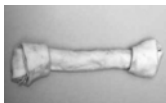
Images from Tingting Chung

Evidence for the taxonomic assumption

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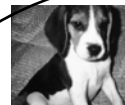


Find another one



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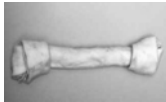


Find another one



Evidence for the taxonomic assumption

- But when they believe they are learning a new word, they focus on taxonomic relations instead.
 - Markman and Hutchinson (1984)

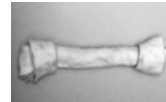


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Find another dog

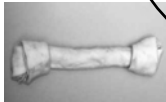


Evidence for the taxonomic assumption

- But when they believe they are learning a new word, they focus on taxonomic relations instead.
 - Markman and Hutchinson (1984)



Find another dog



Evidence for mutual exclusivity

- When asked to “show me the fep”, children pick a novel object over familiar ones.
 - Markman & Wachtel (1988)



See the ferret?



Mutual exclusivity

Advantages

- Helps children acquire terms for things other than objects
- Helps children to narrow overextensions.

Problems

- Bilingualism
- Terms at different levels of a hierarchy
 - Ex: dog and animal
- When a novel label is introduced without a novel category, children accept the label as a synonym

Constraints/principles theories

- Emphasize the importance of cognitive heuristics in word acquisition
- Claim that children operate with a set of word learning biases that assist them in linking words to objects, actions, and events.

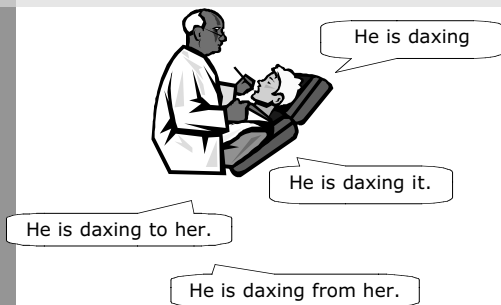
Problems with constraint theories

- Constraints or strategies?
- Explanation or redescription?
- Just nouns!

Syntactic bootstrapping

- Tries to deal with the last problem by assuming that syntax tells the child the class of the word (and thus, what constraints to use).

Syntactic bootstrapping

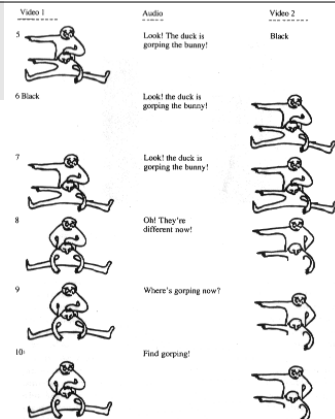


Images from Tingting Chung

Evidence



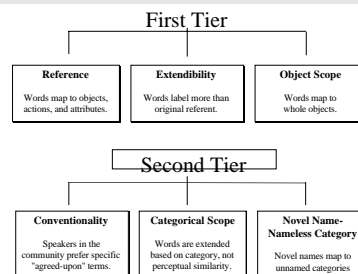
Naigles (1990)



Problems

- This can help restrict the possibilities, but can't narrow it down to one.
- Requires knowing the syntax first.

Levels of constraints?



Social-pragmatic view

- Focuses on parent-child interaction/social cues
 - Joint attention
 - Referential intent

Social-pragmatic view

- Evidence:
 - 19-month-old children attach labels to objects only if adults were attending to the objects when the label was uttered
 - Baldwin, 1995; Baldwin et al., 1996
- Parents who engage in joint attention have children with advanced vocabularies.
 - Akhtar et al. 1991

Clinical implications

- The social-pragmatic view makes certain predictions regarding autism.
 - Autistic children lack the skills to make use of social cues to guide word learning.
 - This leaves them prone to errors in word-learning.

Associationistic account

- Highlights the role of basic attention & memory processes
 - Children attach labels to the items that recruit their attention and stand out from the context

Emergentist coalition theory

- All three views (biases, social-pragmatics, and attentional accounts) are correct at different ages.
 - Attentional factors are important in early development.
 - This leads to social-pragmatic expertise and a “first-round” of constraints, which then cause later, more complex biases.
 - Constraints or principles develop over time, moving from immature to mature states.

Gillette, Gleitman & Gleitman, 1999

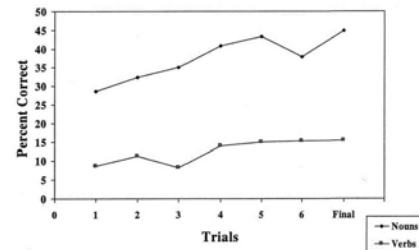
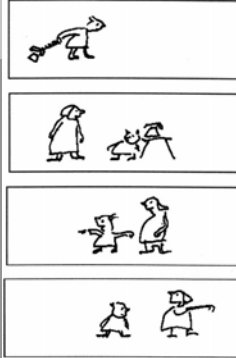


Fig. 2. Mean identification score of target words by trial in Experiment 1.

Most frequent guesses

• Piggy	Piggy	• Go	Hit
• Ball	Ball	• Do	Look
• Mommy	Toy	• Put	Put
• Hat	Hat	• Come	Come
• Elephant	Elephant	• Want	Play
• Plane	Plane	• See	Look
• Bag	Bag	• Look	Look
• Kiss	Mouth	• Get	Hold
• Toy	Toy	• Turn	Play
• Drum	Drum	• Play	Play
• People	People	• Hammer	Put
• Nose	Nose	• Have	Play
• Hole	Hole	• Push	Push
• Daddy	Phone	• Say	Push
• Music	Drum	• Throw	Throw

"What is Gorp?"



etc.

Gillette et al., 1999

- Conditions:
 - Cross-situational observations
 - Noun co-occurrence info
 - Both
 - Syntactic frame
 - Syntax + selectional info
 - All

Gillette et al., 1999

Mystery Verb: GORP means....?	Co-occurring nouns in alphabetical order: gramma, you Daddy, Daddy Daddy, you I, Markie Markie, phone, you Mark Mark.
Mystery Verb: GORP means....?	Syntactic Frames: Why don't ver GORP telfa? GORP wastorn, GORP wastorn. Ver gonna GORP wastorn? Mek gonna GORP litch. Can ver GORP litch on the fulgar? GORP litch. GORP litch.

Gillette et al., 1999

Mystery Verb GORP means....?	Syntax and Selectional Information: Why don't you GORP gramma? GORP Daddy, GORP Daddy. You gonna GORP Daddy? I'm gonna GORP Markie. Can you GORP Markie on the phone? GORP Mark. GORP Mark.
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Gillette et al., 1999

- Cross-situational observation 7.7%
- Noun co-occurrence 16.5%
- Observation + nouns 29%
- Syntactic frame 51.7%
- Syntax + selection 75.4%
- All information 90.4%

Correct identification (in %) of target verb in Experiment 3 (targets listed most to least frequent)

Target	Cross-situational observation	Noun co-occurrence	Observation + nouns	Syntactic frames	Syntax + selection	Full information
	Condition 1	Condition 2	Condition 3	Condition 4	Condition 5	Condition 6
Go	0	20	15	60	65	100
See	0	25	5	90	95	100
Come	0	0	15	40	60	100
Say	0	35	20	85	90	100
Do	0	5	0	15	35	100
Put	5	15	50	75	95	100
Get	10	0	30	40	65	100
Look	25	45	30	95	100	100
Want	0	30	55	90	100	100
Have	0	0	30	30	45	100
Know	0	0	0	90	100	100
Like	0	0	0	80	90	100
Think	0	0	0	90	90	100
Take	15	35	20	60	85	100
Find	10	5	35	45	65	80
Play	5	45	75	50	85	100
Push	50	30	70	15	90	90
Show	0	10	50	90	100	100
Sit	5	5	25	15	55	100
Catch	35	5	15	10	45	40
Call	5	30	50	20	65	60
Make	0	35	50	25	70	80
Eat	15	0	5	5	35	30
Pull	5	20	50	25	85	90
Mean	7.7	16.5	29.0	51.7	75.4	90.4

Fast mapping

- A process by which children store whatever fragmentary, incomplete knowledge they have of words whenever they're encountered