When learners surpass their models

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Welcome to Simon’s world
Meet Simon

• 7 years old
• Profoundly deaf
• Limited ability in spoken English
• Attends local public school
Simon’s environment: Meet the parents

- Both profoundly deaf
- Mother learned ASL at 15, father at 16.
- Both had nonsigning, hearing parents.
- Attended oral schools where sign language was prohibited.
- Neither has native fluency in English.
- ASL is now their primary language
Simon’s environment: The school

- In class for deaf and hard-of-hearing students.
- Mainstreamed for art and PE classes.
- Classmates and schoolmates do not appear to know ASL.
- Teacher uses “Total Communication”: spoken English plus signed English plus signs for English morphology.
Simon’s environment: conclusion

- Parents are only source of input for ASL.
Why is this an interesting case?

• Parents are not native signers of ASL, yet they are the only source of input for Simon.
• We can expect a lot of “noise” in the input. How will Simon deal with this?
Some basic facts about ASL

- ASL ≠ English
- ASL closer to French Sign Language than to British Sign Language.
- Not all ASL signers are deaf, and not all deaf people know ASL (even in U.S.).
- Sign languages are “real languages”
  - Structure
  - Acquisition
  - Brain areas
This study focuses on verbs

- In many languages, verbs carry information about subject (and/or object)
  - John goes to the library.
  - Juan y María van a la biblioteca.
- Each piece of the verb is a “morpheme”:
  - go + (e)s
  - va + n
- The verb’s structure is its “morphology”.
Verb morphology

• In some languages, verbs are morphologically very complex, containing much information about the subject or other elements.

• In others, verbs are morphologically very simple, sometimes having no morpheme other than the verb itself.
ASL verbs are morphologically complex.

Seven Morpheme Categories of ASL Verbs of Motion

Root = Path along which object moves
Orientation = Orientation or direction in which the object moves
Manner = Manner in which the object moves
Location = Locative relationship of moving object to secondary object
Position = Position of the secondary object with respect to the central object path
Central Object Handshape = Class (category or size and shape) of the moving object
Secondary Object Handshape = Class (category or size and shape) of the secondary object
Two types of morpheme in ASL verbs of motion

- **Motion/location:**
  - Root (straight line, circle, etc.)
  - Orientation (backwards, uphill, etc.)
  - Manner (bouncing, rolling, etc.)
  - Location (spatial relation of central object relative to secondary object)
  - Position (spatial relation of secondary object relative to path)
Two types of morpheme in ASL verbs of motion

• Handshape
  – Central object (human, vehicle, cylindrical, etc.)
  – Secondary object (human, vehicle, cylindrical, etc.)
Examples

• To describe a car driving down the road:
  root  central object
  CAR    LINEAR+VEHICLE

• To describe a doll jumping into a hoop:
  DOLL
  Root    Central object Secondary object Location  Position
  JUMP+HUMAN + ROUND  +  INTO + END
Simon’s input (parents)

• Motion/location morphemes: 70% correct

• Handshape morphemes: 45% correct
Parents compared to native ASL signers
Parents compared to adult late learners of ASL
What are parents’ errors like?

• Incorrect morpheme
  – Substitutes LINEAR root for TURN root

• Omitted morpheme
  – Required morpheme not present

• Split verb
  – Morphemes produced sequentially instead of simultaneously
Split verb errors especially confusing

A car moving uphill should be:

CAR  VEHICLE+LINEAR+UPHILL  
(simultaneous)

Error:

CAR  MOVE  STRAIGHT  UPHILL  
(sequential)
Proportion of error types
Simon’s input: summary

• Motion/location morphemes:
  – 65-83% correct

• Handshape morphemes:
  – 37-46% correct

• Input is thus inconsistent and “noisy”

……so what will he do with this input?
Simon’s output: motion/location morphemes

- 84-91% correct

- Compare to parents: 65-83%
Simon compared to native children
Simon compared to native children and parents: motion/location morphemes
Simon’s output: handshape morphemes

• 46-59% correct

• Compare to parents:
  37-46% correct
Simon compared to native children and parents: handshape morphemes
Motion/location morphemes vs. handshape morphemes

• Simon does lots of “frequency boosting” with motion/location morphemes.

• Not so much with handshape morphemes.
Motion/location morphemes

![Graph showing data related to motion/location morphemes with points representing different percentages and categories labeled as 'Mother' and 'Father'.]
Handshape morphemes
Why this difference?

• Parents’ overall accuracy with handshape morphemes is less. Perhaps this is too much inconsistency.

• Parents most frequent form for handshape morphemes is sometimes not ASL.
Example of parents’ non-ASL handshapes

- Standard ASL form for VEHICLE
- Parents’ most frequent form for VEHICLE
More reasons for Simon’s poor performance with handshape morphemes

• Parents had some highly frequent forms without clear meaning
Some other possible reasons

- Motion/location morphemes often iconic, handshape morphemes often not.
  - But iconicity doesn’t seem to play a big role.

- Handshape morphemes take longer to acquire: Simon could be delayed.
So….

• Simon’s worse performance on handshape morphemes seems understandable, given:
  – Nature of his input
  – Nature of these morphemes
Summary

• Simon receives inconsistent, “noisy” input.

• But Simon regularizes this input (as evidenced by “frequency boosting”).

• And creates a qualitatively different system than what his parents have.
This is powerful evidence against:

• The idea that children learn language through imitation.

• The idea that children match the probabilities in the input.