ASL IPSyn: A new measure of grammatical development

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SLAASh

The Need

- Few existing instruments for measuring ASL development in 2- to 4-year-old children
- No existing longitudinal descriptive data on morpho-syntactic development
- Researchers need ways to compare across children
- Available checklists (e.g., VCSL; Simms et al. 2013) based on disparate studies
- No comparable measure focusing on production of syntax
- Need information on native signers to compare later learners

IPSyn = Index of Productive Syntax

- Originally developed for English 2- to 4-year-olds by Scarborough (1990)
- List of English morpho-syntactic structures in four subscales:
  - Noun phrases, Verb Phrases, Questions/negations, Sentence structures
- Structures organized according to typical acquisition sequence
- Child is awarded up to 2 points for using the structure in a 100-utterance sample of free speech

- Subsequently used in hundreds of studies, including
  - Typically developing speakers of mainstream English (Jalilevand & Ebrahimipour 2014)
  - TD children who speak African American English (Oetting et al. 2010)
  - Late talkers (Rescorla et al. 2000)
  - Children with SLI (Hewitt et al. 2005)
  - Children with autism (Eigsti et al. 2007)
  - Oral deaf children using cochlear implants (Nicholas & Geers 2008)
- Highly correlated with MLU, particularly for younger children
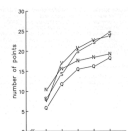
ASL-IPSyn

- Our adaptation is based on grammatical structures found in ASL – with the addition of a subscale for DS (depicting/classifiers)
- We have gone through several iterations aiming to enhance the measure's ability to distinguish between more and less advanced children
- Current version has max score of 146 on 5 subscales
- Coding reliability (current version): exact coding agreement of 87% by items on 6 sessions

Participants

- Four Deaf children with Deaf, signing parents (middle class, educated parents)
- Observed longitudinally over the age range 1;06-4;00
- Data collected under the CLESS project (Lillo-Martin & Chen Pichler 2008)
- Data now being prepared for sharing with other researchers under the SLAASh project (Sign Language Acquisition: Annotation, Archiving, and Sharing) slla.lab.uconn.edu/slaaash
- Sessions at ~24, 30, 36, and 42 months analyzed using latest version of ASL-IPSyn
- These sessions also coded for MLU (adapted version of Lillo-Martin et al. 2012)

| Pseudonym	Age range observed (yrs;mths)	Ages coded for ASL-IPSyn (mths)
ABY	1;05-3;04	24, 30, 36, 42
JIL	1;07-3;07	24, 30, 36
NED	1;06-4;02	24, 30, 36, 42
SAL	1;07-2;10	24, 30, 36

Procedure

- A sample of spontaneous speech is collected (~60 mins). Interlocutor should be familiar to child; prompt as needed but encourage child to sign.
- Video is fully annotated (we follow ASL SLAAASh conventions, modified from Chen Pichler et al. 2010; including ASL SignBank).
- 100 utterances to be coded are identified (we use ASL SLAAASh MLU criteria; Lillo-Martin et al. 2012).
- Utterances are searched for 1-2 instances of each structure type. Each token is typed in an Exemplar cell with its time on video.
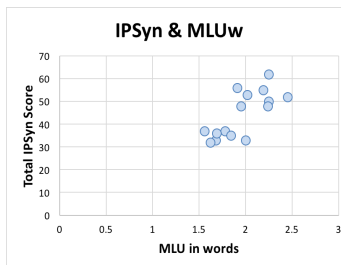- Points are calculated and filled in automatically.

Results

IPSyn scores

Total IPSyn Score

Mean Total IPSyn Score

IPSyn and MLU

IPSyn & MLUw
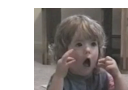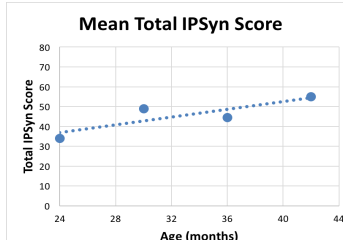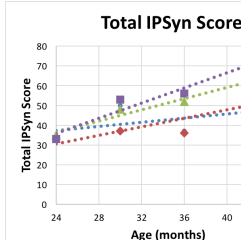
Order of Acquisition

We determined order of acquisition by noting the earliest age at which structures were used by **all** participants.

At 24 months, all 4 participants used:
- pointing to self ('me')
- a noun
- a first-person possessive ('my')
- a verb
- an adjective
- a depicting (classifier) sign referring to an entity
- a sentence containing a subject and a predicate (in either order)
- a sentence with two verbs

At 30 months, all 4 participants used:
- an adverb
- a verb modified in form to indicate the location of an activity ('spatial' verb)
- WHAT and WHERE
- a sentence having a full noun subject and a verb (in that order)
- a sentence having a verb and a full noun object (in that order)

At 36 months, all 4 participants used:
- a verb modified to show the manner of an activity
- a sign indicating time (FUTURE, FINISH)
- a depicting (classifier) sign indicating handling of an object
- a sentence occurring with a head nod

At 42 months, all 3 participants used:
- pointing to another person (you/he/she/they)
- a verb modified to indicate the subject and/or object
- a sentence having a full object noun and a verb (in that order)
- a sentence with three verbs
- a sentence occurring with a headshake
- a verb with negative incorporation (DON'T-KNOW)
- a two-word wh-question

These results show that many utterance basics, including two-word utterances, are acquired by age 2-2;06, as reported in the sign language acquisition literature (summarized in Chen Pichler 2012). Verb modifications and use of non-canonical word order are present by 2;06-3;06 (these show up earlier in some studies; the later age here is likely due to low frequency). Contrary to some reports, we find the use of depicting signs as early as 2;00, with entity forms appearing consistently much before handling forms.

Sample Score Sheets

Noun Subscale

Item	Brief Description	Example	Also credit
N1	NOUN	MOTHER; SCHOOL; BOOK	
N2	NOUN (CONJ) NOUN	MOTHER FATHER HAPPY	N1
N11	ADJ ^ NOUN	BLACK CAT HAPPY; CAT BLACK EAT	N1, N9, N20
N12	QUANT	ALL; EVERY; FEW; MANY; MORE	

Verb Subscale

Item	Brief Description	Example	Also credit
V1	VERB	EAT; LIKE	
V2	VERB[location modification]	LEAVE-IT produced in location item should be left; SCHOOL-a CHURCH-b a-GO-b	V1
V3	VERB[person modification]	TELL-you; me-TELL-you; GIVE-me; you-GIVE-me	V1
V11	MODAL	CAN; NEED; MUST	V1
V12	MODAL ^ VERB	CAN WRITE	V1, V11, S12

Depiction Subscale

Item	Brief Description	Example	Also credit
D1	Size & Shape specifier (SASS)	DS_f[thin-horizontal-tube]	
D2	Entity	DS_3[car-driving-uphill]	
D3	Handling	DS_s[brushing-teeth]	

Question/Negation Subscale

Item	Brief Description	Example	Also credit
Q1	Early wh-word	WHAT (any form); WHERE	
Q2	Late wh-word	WHO; WHY; HOW; WHEN	
Q6	wh nonmanual	EAT WHAT produced with furrowed brows	Q1 or Q2
Q7	Yes/No Q	IX[mother] WANT EAT ?	
Q8	Indirect question	IX_1 DON'T-KNOW WHO IX[man]	
Q9	Manual negation of Sent w/NOT	IX_1 NOT COOK	

Sentence Type Subscale

Item	Brief Description	Example	Also credit
S1	NOUN-subj VERB	MOTHER EAT; CAT LIKE	V1
S2	VERB NOUN-obj	EAT CRACKER; LIKE BOOK	V1
S3	NOUN-obj VERB	CRACKER EAT; BOOK LIKE	V1
S10	Loc S ^ V	OUTSIDE MOTHER SIT	V1, S8
S11	Subj ^ Pred	IX[dog] DOG; IX_1 HAPPY	
S12	VERB VERB	WANT EAT	V1

Next Steps

- We will complete coding of monthly sessions for ABY, JIL, NED, SAL
- We are also coding data from at least 3 additional Deaf native signers at 24, 30, 36, 42, and 48 months
- Further revisions to the form will be made as needed
- We welcome other researchers interested in using the current version of ASL-IPSyn
  - See handout
  - Go to SLLA Lab website for Excel version with formulas and manual
- If you contribute anonymized data we can enlarge the baseline data set

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