

Depicting Signs in Bimodal Bilingual Code Blending

A corpus study

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Bilingualism as a window into linguistic structure

Goals of our talk today:

Investigate a challenging phenomenon for sign language formal linguistics: **depicting signs/classifier predicates**

Use data from **bimodal bilingual language** production to test theories of:
(a) code-blending and **(b)** syntactic/semantic structure of depicting signs (DS)

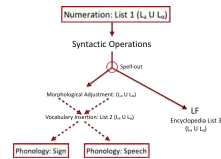
Bimodal (Sign/Speech) Bilingualism

We will begin with one **model of bimodal bilingualism**:

- Language Synthesis Model (Lillo-Martin, Quadros, Chen-Pichler, 2016)

Language Synthesis Model:

A bilingual utterance involves a single syntactic structure and semantic form



Predictions:

1. Bimodal (sign/speech) *code-blends* should be limited to material that **shares underlying structure and meaning**
2. Code-blends can therefore inform syntactic and semantic theories of each language, including depicting signs

Formal Syntactic/Semantic Theories of Depicting Signs

Depicting Signs/Classifier Predicates

- Common in nearly all sign languages of the world
- Involve:

Handshape that reflects the noun class of its arguments

Movement and location provide spatial information

Motivation for the term "classifiers"

Motivation for the term "depicting signs"

Supalla 1986; Emmorey 2008; Emmorey and Herzig 2003; Zwitserlood 2012, a.o.

Depicting signs: Formal semantics

Handshape that reflects the noun class of its arguments

+ Movement and location provide spatial information

Based on a morphemic but "semantically light" verb (e.g. MOVE/BE-LOCATED) that agrees with noun class...

... and a obligatory manner depiction/demonstration that is not morphemic

Zucchi, Geraci, & Cecchetto 2012, Davidson 2015

Depicting signs: Formal semantics



BOOK DS_b(fall-down)

1. $\exists e[(\text{moving}(e) \ \& \ \text{theme}(e, \text{book})) \ \& \ \text{demonstration}(e, \text{path})]$

From subject (that agrees with handshape) From location and movement

'The book (a flat object) went like [path movement]'

A demonstration code-blended DS: Sound effect = Vocal gesture

Participant 2:
The other years always they plan
OTHER YEAR ALWAYS THEY PLAN

family will eh eh eh
FAMILY WILL CL:3(car drives randomly)

"In other years, my family would plan extensive road trips."



Emmorey, Borinstein, Thompson, & Gollan 2008

Categories of Depicting Signs



BOOK DS_b(fall-down)

Entity DS



BOOK DS_fc(move-book)

Handling DS

Argument Structure (Benedicto and Brentari 2004)



BOOK DS_b(fall-down)

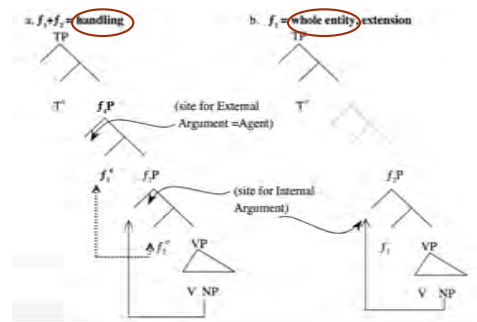
Entity DS
One internal (Non-agent) argument



BOOK DS_fc(move-book)

Handling DS
Same internal + One external agent argument

DS Argument Structure (Benedicto and Brentari 2004)



Syntax and Semantics

Syntax adapted from Benedicto & Brentari 2004
Semantics adapted from Davidson 2015

Whole entity classifier

$clP_2 = \lambda e. move(b)(e) \& demn(d, e)$

Spec=b
BOOK

$cl'_2 = \lambda e. move(b)(e) \& demn(d, e)$


$cl_2 = \lambda d \lambda e. demn(d, e)$
Classifier-internal arg

$VP = \lambda e. move(b)(e)$

V'

$V = \lambda x \lambda e. move(x)(e)$
MOVE

DP=b
BOOK



Logical translation: 'There exists an event of moving a book, of which d is a demonstration.'
Translation to natural English: 'A book moved like [gesture].'

Syntax and Semantics

Handling classifier

$clP_1 = \lambda e. move(b)(e) \& agent(g(x))(e) \& demn(d, e)$

Spec=x
IX_e

$cl'_1 = \lambda e. move(b)(e) \& agent(x)(e) \& demn(d, e)$

$cl_1 = \lambda x \lambda e. agent(x, e)$
Classifier-external arg

$clP_2 = \lambda e. move(b)(e) \& demn(d, e)$

Spec=b
BOOK

$cl'_2 = \lambda e. move(b)(e) \& demn(d, e)$


$cl_2 = \lambda d \lambda e. demn(d, e)$
Classifier-internal arg

$VP = \lambda e. move(b)(e)$

V'

$V = \lambda x \lambda e. move(x)(e)$
MOVE

DP=b
BOOK



Logical translation: 'There exists an event of moving a book, of which the referent of the pronoun is an event, and d is a demonstration.'
Translation to natural English: 'He/she/it moved the book like [gesture].'

Bilingualism as a window into linguistic structure

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Prediction 1: DS verbs involve more **code-switching** (sign only productions) than non-DS verbs and also **sound effects**
Predicted by demonstration element in semantics



Bilingualism as a window into linguistic structure

Prediction 1: DS verbs involve more **code-switching** (sign only productions) than non-DS verbs and also **sound effects**
Predicted by demonstration element in semantics

Prediction 2: Entity DS may be code-blended with verbs, objects, prepositions, adverbs, while Handling DS include **subjects**, too
Predicted by syntactic asymmetry

Data Collection and coding





Adult bimodal bilinguals (Codas)

- 3 from USA (ASL, English) 
- 1 from Brazil (LIBRAS, Brazilian Portuguese) 

Narratives of "Canary Row" cartoon in US and narrative of Charlie Chaplin short clip in Brazil, always to other bimodal bilinguals

Coding in ELAN: includes utterances in each language, type of verb (e.g. plain, non-plain (including DS)), modality (sign, speech, bimodal), and timing

4 Participants





Codas	Sign rating** 1-7	Speech rating** 1-7	Interpreter?
FB - Brazil 	5	7	no
B2 - USA 	6	7	no
M4 - USA 	7	7	yes
M5 - USA 	7	7	yes

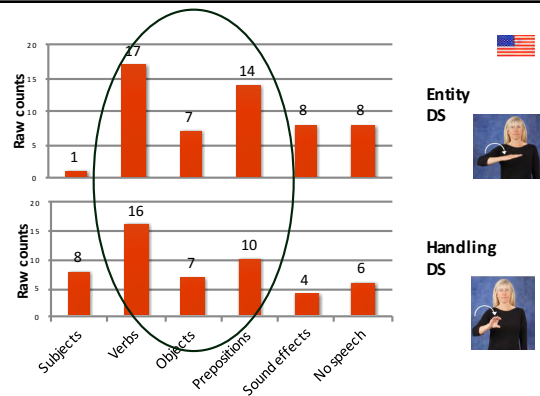
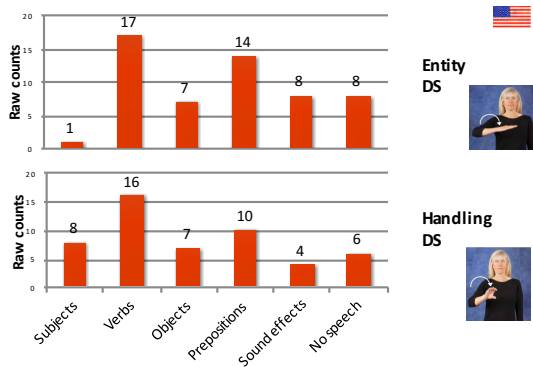
**self-sign rating and native speaker/signer-rating

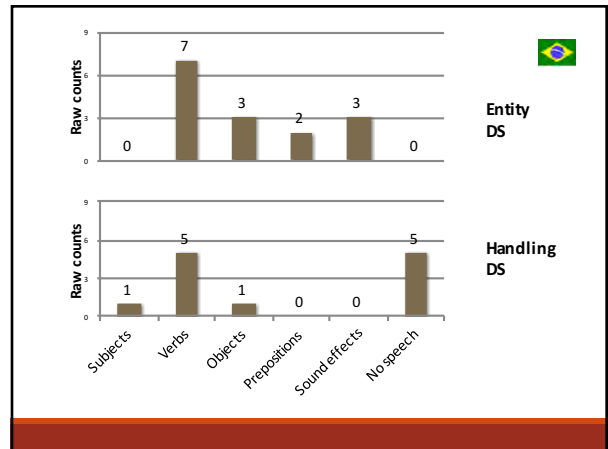
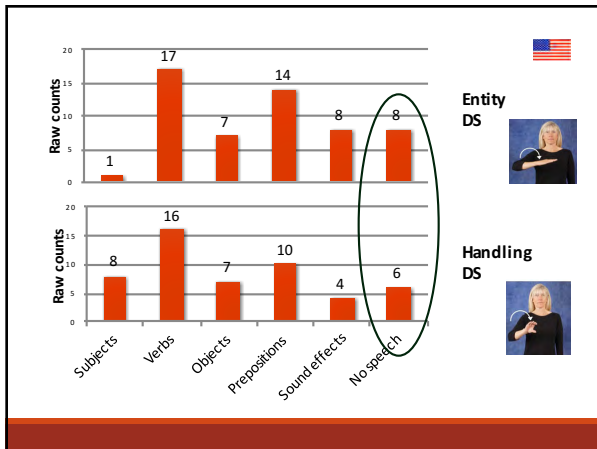
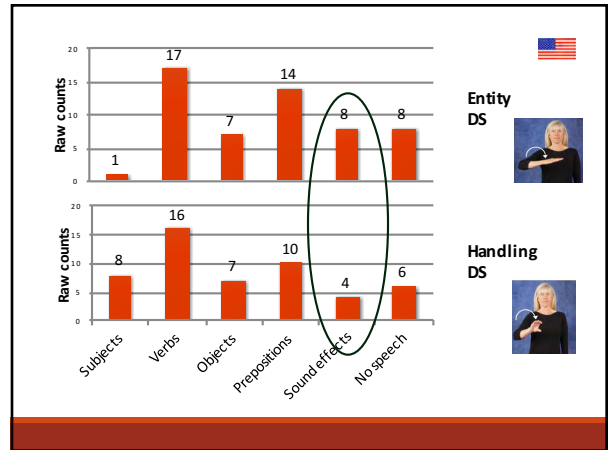
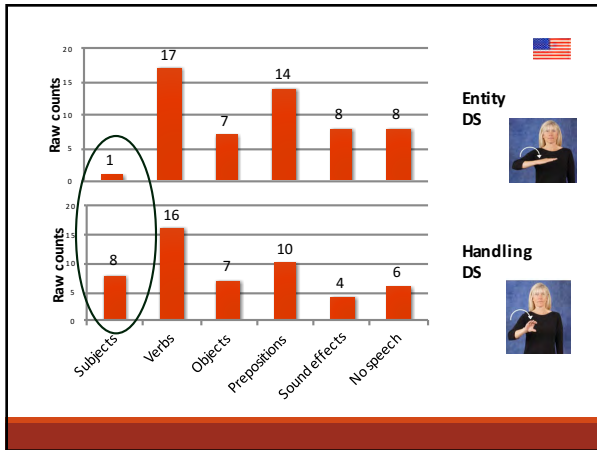
Results

- I. Quantitative Overview
- II. Examples

Depicting signs are more likely to be produced alone (without speech) compared to other verb types

Codas	Total Number DS		Total Number other verbs	
	Sign only	Bimodal	Sign only	Bimodal
FB - Brazil 	8	14	2	34
B2 - USA 	4	7	3	44
M4 - USA 	6	24	0	55
M5 - USA 	15	10	7	85





Handling DS blended with subject

DS(climb-up-pipe)
So he climbs up that


DS:

Handling DS blended with subject

DS(grandmother-hitscat-withumbrella) "palm up" AGAIN
and she beats him,


DS:

Entity DS not blended with subject




DS(round-belly) DS(cat-rolls-through-wall) BOWLING FS(alley) DS(knock-down) FS(pins)
and then he ends up going to a bowling alley and knocks down all the pins

DS:

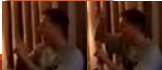


Entity DS not blended with subject




IX(self) WANT SEE IX(self) DS(cat-climb-up)
I want see me climb

DS:




Entity DS not blended with subject




NOW FS(he) DS(cat-walking-around)
so now he walk walk walk walk walk walk

DS:




Depicting sign with sound effect




GO PLACE DS(get-store) DS(throw-away-store-to-window) BREAK CL ASS. DS(glass-break)
BREAK E(POSITIVE).
Vai num lugar pega pedra joga para quebrar o vidro. &=soundeffects. Quebrou, sim.
The son goes to a place and throws away the stone to break the window. The glass breaks

DS:



"pftst"

Depicting sign with sound effect




"so Tweety sees this and says"

DS(round-object) BOWLING BALL. DS(lift-ball), DS(drop-ball) ENTER FS(gutter).
____ Bowling ball, ____ drops it down into the gutter.
There is a bowling ball that Tweety drops down into the gutter.

IX(gutter) VERY FOODFS(gutter) DS(ball going down gutter) RT FS(ball)

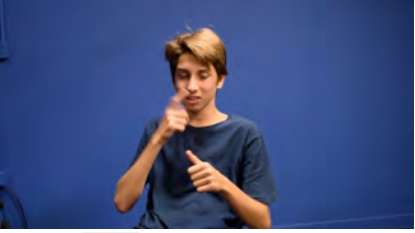
Very good gutter, you know, & sound effects, to fit the ball.
It's a very good gutter to fit the ball from up to down.

DS:




"pft pft pft"

Depicting sign with no speech



THIRD TIME SON DS(go-to) FS(vai) DS(throw-away-stone). COP ARRIVE.
Ai terceira vez o filho vai ____ vai jogar. A policia chega.
Then, for the third time, the son will throw away the stone. The cop arrives.

DS:





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Result 1: DS verbs have more **code switching** (sign only) and more **sound effects (vocal gestures)** than non-DS verbs
Predicted by demonstration element in semantics ✓



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Result 2: Entity DS are code-blended with verbs, objects, prepositions, adverbs, while Handling DS include **subjects**, too
Predicted by syntactic asymmetry ✓

Discussion

- Our analysis of code-blends provide more evidence of the *morpho-syntactic complexity of depicting signs*
 - Further support for both morphemic and non-morphemic components
- Results are particularly compatible with theories of bilingualism that predict tight connection between syntax and semantics of both languages

Looking ahead

Encourage more formal theories of syntax, semantics, and bilingualism that make specific predictions for both monolingual and bilingual language patterns

- More work to be done testing these predictions with much larger data samples than the one we presented, including from
- conventional linguistic judgments
 - corpus studies
 - psycholinguistic experiments

Acknowledgments

Participants

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- National Institute of Child Health and Human Development (R01 HD047736) (KE)

Extra material

Counterexample: Entity DS blended with subject

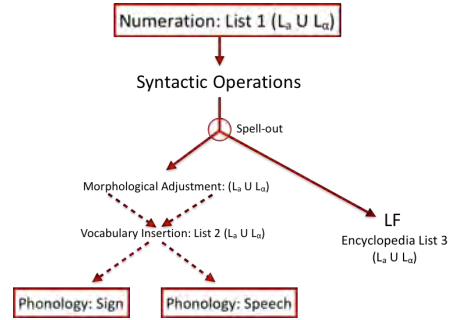


LAST ONE IX FS(cable-car) WIRE- DS(at-walk-across-wire)
 the last one there's a cable car wires and he's walking on that

Synthesis model

Lillo-Martin, Quadros, & Chen-Pichler, 2016

A single derivation with the option of using elements from multiple languages

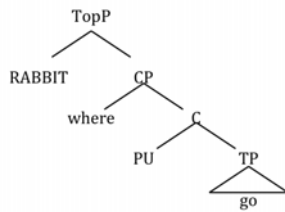


Synthesis model

Lillo-Martin, Quadros, & Chen-Pichler, 2016

A single derivation with the option of using elements from multiple languages

Sample blended syntax



Sign: RABBIT PU
 Speech: where go
 Translation: Where did the rabbit go?

DS Blends with speech

M5(USA) – Partially preserved content in English: verb only

ASL: DS(climb-up-pipe)
 English: climb
 (He) climbed (up the pipe).

M5(USA) – Partial preserved content in English: preposition, article and object

ASL: DS(across-the-street)
 English: across the street
 (He walked) across the street.

DS Blends with speech

M4(USA) – Preserved more contents in English

ASL: DS(walk-across-wire)
 English: he's walking on that
 He is walking on the wires.

M5(USA) – Partial preserved content in English: verb plus aspect expressed through repetition

ASL: DS(walking-around)
 English: walk walk walk walk walk
 (He) walked (around continually).