Phonological Processes in Shanghai Sign Language

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Introduction & Background

- **Phonological processes** are the results of applying a set of 'rules' which manipulate the phonological shape of the underlying forms to obtain surface forms.
    - **lexical:** within a word
    - **post-lexical**: across words

- ASL: evidence for **lexical** (Klima & Bellugi 1979, Liddell & Johnson 1986, Sandler 1987, Brentari 1998) and **post-lexical** (Battison 1974, 1978; Kegl & Wilbur 1976; Klima & Bellugi 1979) processes.
- Other sign languages also show these patterns (NGT: van der Kooij 2002 ; BSL: Deuchar 1984, Brennan 1990; Auslan: Johnson & Schembri 2007; ISL: Meir & Sandler 2008; LSF: Woodward & Desantis 1977).
- Recently, phonological processes at the post-lexical level tend to be approached from a phonetic perspective, with a focus on effects of the neighboring units and rate of speech (Cheek 2001; Crasborn 2001; Mauk 2003; Russel et al. 2011; Grosvald & Corina 2012; Ormel et al. 2013, 2017).

Current Study

- **Shanghai Sign Language (SSL)** is an understudied sign language variety of Chinese Sign Language.
- Data: **citation forms of lexical signs** (N=2070) produced by two Deaf SSL signers and a **mini-corpus of naturalistic signing** (2h, 56min; genres: speech, narratives, conversations) collected from 17 SSL Deaf signers (mean age: 56; 5 females, 12 males).
- For the **citation forms:** we analyze the phonological modulations that the constituting signs have undergone in forming **morphologically complex signs**.
- For the **mini-corpus data (connected signing):** modulations are annotated and compared to the citation forms.
- **A modulation is included if it:**
    - occurs in more than one signer; OR
    - is observed more than twice in the same signer.

Table 1. Phonological processes observed in SSL (Blank cells in the rightmost two columns indicate accidental gaps or not yet attested in the current SSL data)

Types	Units modulated	Subtypes			lexical	post-lexical
Assimilation	handshape	total assimilation			√	
		partial assimilation	selected fingers	total	√	√
				partial	√	√
		joint position				√
	location				√	√
	movement					√
Deletion	handshape					
	movement				√	√
	weak hand				√	√
Epenthesis	weak hand				√	√
	movement				√	√
Metathesis	location					√
Reduction	movement	distalization				√
		manner			√	√
Coalescence	handshape, location, movement, weak hand				√	√

Phonological processes (lexical) are OBLIGATORY

- Processes at the lexical level are obligatory and occur within morphologically complex word formation.
- The processes attested in the formation of complex words encompass concatenative morphological operations of **compounding** and **affixation** (instantiated by negative incorporation), and nonconcatenative morphological operations of **initialization** and **numeral incorporation**.

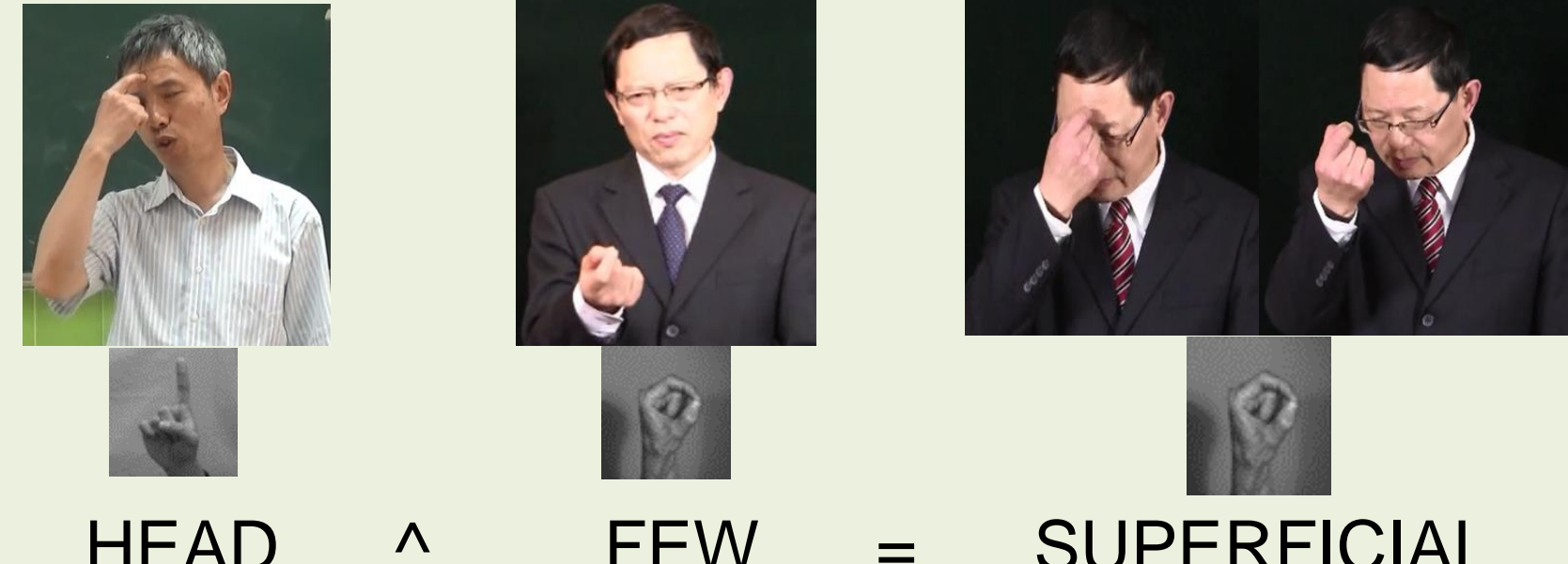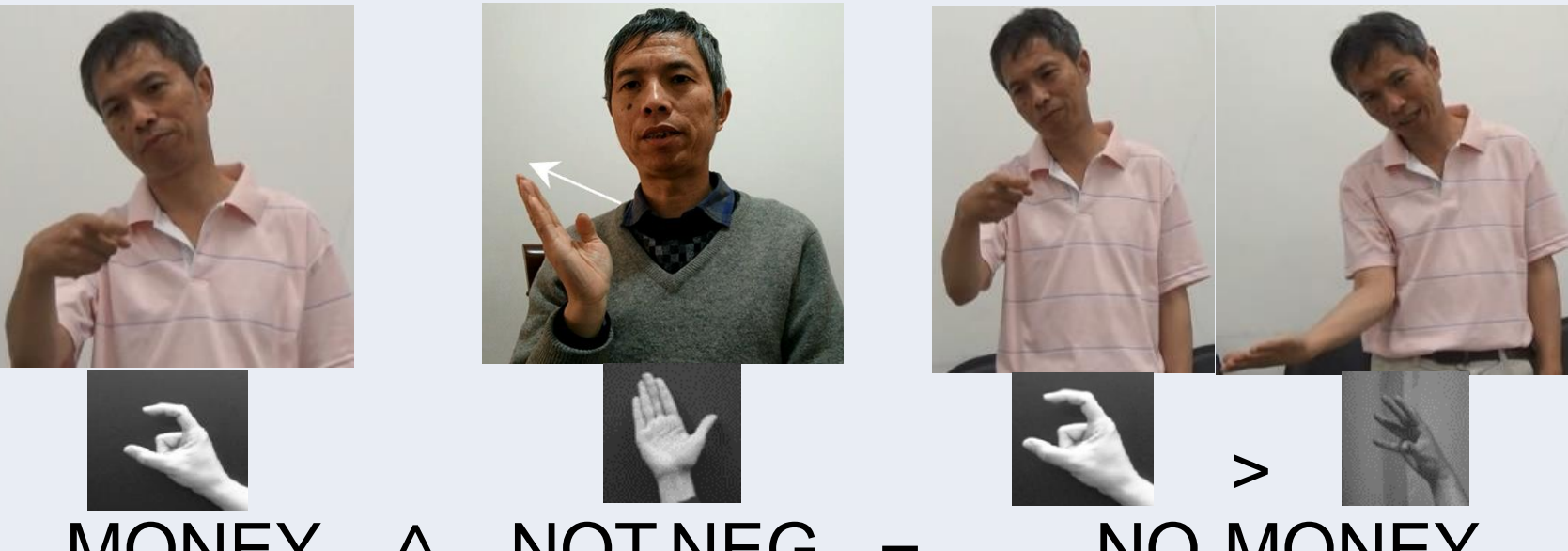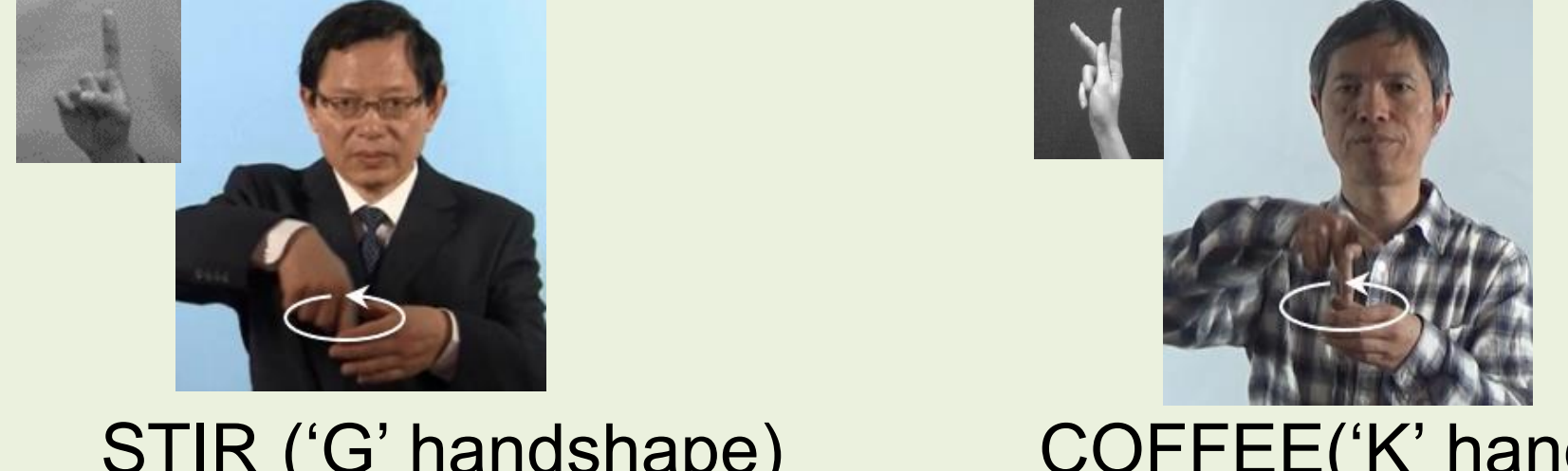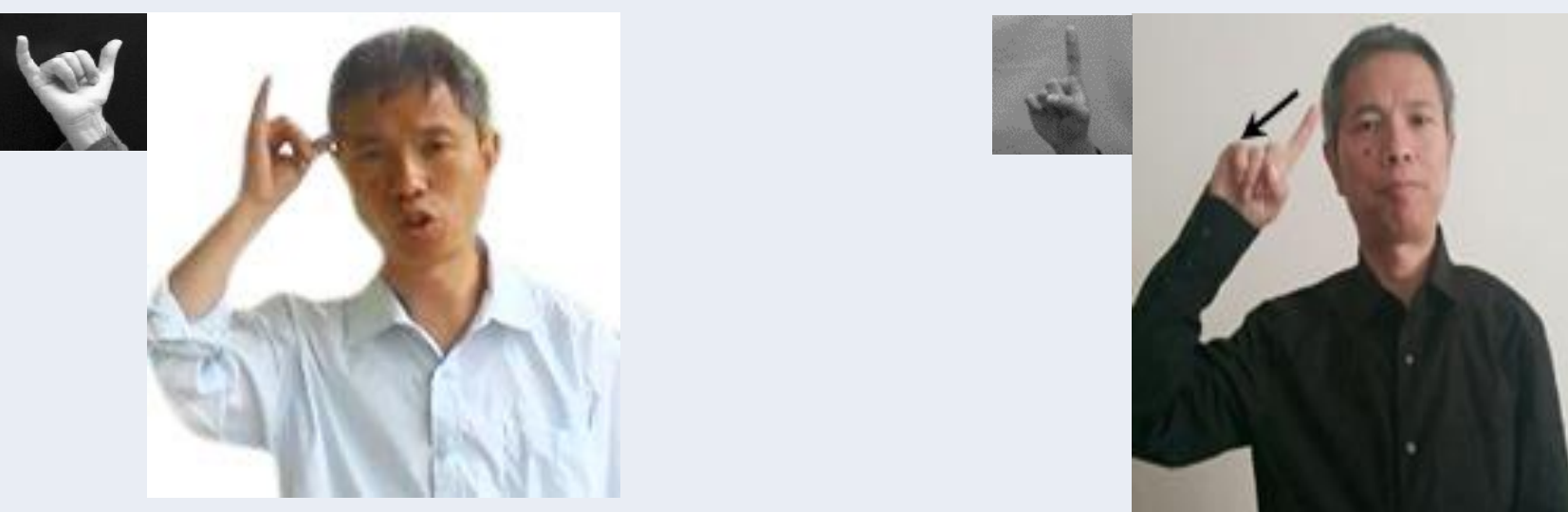Table 2. Phonological processes in complex word formation (concatenative)

Concatenative morphology	Phonological processes	Citation form examples
Compounding	regressive handshape assimilation, progressive location assimilation, syllable reanalysis	HEAD ^ FEW = SUPERFICIAL
Affixation (negative incorporation)	deletion of the base sign movement, syllable reanalysis	MONEY ^ NOT.NEG = > NO-MONEY

Table 3. Phonological processes in complex word formation (non-concatenative)

Nonconcatenative morphology	Phonological processes	Citation form examples
Initialization	Handshape substitution	STIR ('G' handshape) COFFEE('K' handshape)
Numeral incorporation	Handshape substitution	TEN-CENTS ONE-TEN-CENTS

Phonological processes (post-lexical) are OPTIONAL

- Processes at the post-lexical level occur in connected signing and are optional.
- Apart from assimilation and reduction, other processes such as deletion, epenthesis, and metathesis, are attested at the post-lexical level in SSL.
- The phonological processes at the post-lexical level are mainly triggered by the neighboring units, which aligns with the findings from the phonetic study on other sign languages.

Table 4. Phonological processes in connected signing

Phonological process	Examples from connected signing
Dropping of the weak hand	FINISH.ASP { GROW FINISH.ASP CHILD }
Epenthesis of the weak hand	SURPRISED { PEOPLE SURPRISED }
Metathesis of location	DEAF { COUNTY DEAF OLD }

Conclusion

- Phonological processes at the **post-lexical** level apply **optionally**, whereas similar processes at the **lexical** level are **obligatory** since they are frozen in the SSL lexicon.
- Handshape, location, movement, and weak hand can be modulated alone, supporting their status as natural classes in constituting the internal structure of a sign.
- The dichotomy between the obligatory processes at the lexical level and the optional processes at the post-lexical level is observed in multiple sign languages and merits further investigation.

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