THE CULTURAL EVOLUTION OF COLLATERAL SIGNALS

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Cultural evolutionary approaches to language often focus on the most prototypical lexical items and grammatical structures (Croft 2000; Enfield 2014). However, everyday language use features a wide range of communicative signals, many of which are considered to fall outside the boundaries of language proper. Here we focus on the cultural evolution of *collateral signals*, short for the metacommunicative resources used in the back channel or collateral track of communication (Yngve 1970; Clark 1996). Such signals have long been seen as primitive grunts representing "only the outskirts of real language" (Müller 1861). But in fact metacommunication represents a major advance in the evolution of communication and language (Bateson 1972) and collateral signals play crucial roles in streamlining complex language use. Far from marginal grunts, collateral signals are central elements of the linguistic machinery. We combine comparative linguistics and computational modelling to study their cultural evolution.

Some widespread collateral signals include continuers like 'mm' (Schegloff 1982), delay markers like 'u:h' (Clark & Fox Tree 2002), and repair initiators like 'huh?' (Dingemanse et al. 2013). Corpus-based work on these interjectional items in English has proposed they form a "specialized sub-language" (Ward 2006) with a small inventory of phonological building blocks that only partly overlaps with that of other words. Collateral signals frequently feature multimodal components (Bavelas & Chovil 2000) and marginal or extra-phonemic sounds like clicks (Gil 2013). Here we propose that the minimal, multimodal, and marginal properties of collateral signals can be explained by thinking of them as a distinctive stratum of vocabulary adapted to metacommunicative needs under interactional pressures (Slonimska & Roberts 2017). Simplifying somewhat, across languages, the most adaptive collateral signals will be those that are easy to produce, minimally disruptive to the interaction, and maximally distinctive from regular vocabulary.

Step 1: Comparison. We first present crosslinguistic evidence for the structural properties of collateral signals relative to other words. Two key challenges are the paucity of descriptive & corpus data and the question of how to ensure comparability. We start with a convenience sample of 5 languages from 4 phyla for which sufficient conversational corpora are available. We use the sequential structure of conversation to ensure we are comparing like with like, focusing first on continuers: responses uttered during extended multi-turn stories. Table 1 compares regular vocabulary and continuers in structural terms (based on data from Fenk-Oczlon & Fenk 1999; Moran & McCloy 2019; and CALLHOME).

Table 1. Phoneme inventory size, phonemes/word, and syllables/word in regular vocabulary vs continuers (CS) in 5 languages from 4 phyla

language	***phonemes***	*…in CS*	***phon/word***	*…in CS*	***syll/word***	*…in CS*
Am. English	39	6	3,5	1,8	1,3	1,2
Arabic	35	5	6,2	1,9	2,4	1,2
German	41	5	4,0	2,0	1,4	1,3
Mandarin	49	8	2,7	1,5	1,0	1,0
Japanese	20	8	3,8	2,3	1,9	1,0

Continuer-type collateral signals in conversational corpora are phonologically less diverse, structurally simpler, and shorter than other words. While their brevity may be linked to frequency, a comparison with 154 words at least as frequent in English shows that the structural simplicity of continuers is still much lower than expected (1,8 phon/word in CS versus 2,9 in the frequency-matched sample, t = 3.37, df = 160, $p < 0.001$). They are also similar in form: in all 5 languages, the top 4 phonemes are [m, n, a, ə] and all can be accompanied by or realised as nods. Such cross-linguistic similarities likely result from convergent cultural evolution under common metacommunicative needs (Dingemanse 2017).

Step 2: Computational modelling. If collateral signals need to be (i) easy to produce, (ii) minimally disruptive yet (iii) maximally distinctive, this should push them into relatively circumscribed and cross-linguistically similar parts of the phonological and multimodal form spaces. We are developing computational models of the cultural evolution of collateral signals to formalise and test these proposals. Interjections have long been treated as the "here be dragons" of parts unknown. Our comparative and computational approach suggests that a redrawing of the borders of language may be in order, and that collateral signals have a role to play in the story of the cultural evolution of human language.

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