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# Leveraging monolingual developmental techniques to better understand heritage languages

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In their keynote article, Polinsky & Scontras (**P&S**) highlight intriguing behavioral similarities between heritage language (**HL**) use and monolingual development (i.e., avoiding ambiguity, resisting irregularity, and shrinking structure). Moreover, just like monolingual children when compared to monolingual adults, HL speakers seem to have more limited input and more limited cognitive resources available to deploy. As P&S note, HL speakers may well be in a state of frozen development, incomplete acquisition, or “developmental arrest”. This latter term is also used in the Williams Syndrome literature (Landau & Ferrara, 2013) to describe what’s occurring in an atypically-developing monolingual population that reaches around a five-year-old level of language knowledge. Because of this, the Williams Syndrome population may serve as another useful comparison population for HL speakers.

Given all this, I wonder if we can leverage existing comparative, behavioral, and computational approaches that are currently deployed to understand monolingual development in order to better understand HLs. We could then see how much the divergent attainment in HL speakers (when it occurs) resembles intermediate stages of monolingual development or the arrested development of Williams Syndrome populations. For instance, since we often have a reasonable idea about what’s acquired earlier vs. later in monolingual children, does this serve as a reasonable marker of things acquired vs. not acquired in HL speakers, the way it seems to for Williams Syndrome populations? If so, this would allow us to better predict which phenomena are likely to be resilient vs. vulnerable in HL speakers.

Importantly, non-adult behavior in children can sometimes be mitigated with experiments designed to lessen the cognitive load, and so allow speakers to demonstrate underlying linguistic knowledge (e.g., Conroy, Takahashi, Lidz, & Phillips, 2009; Viau & Lidz, 2011). These same approaches may therefore yield a clearer picture of HL speaker knowledge. Also, it may be that the non-monolingual behavior we see in HL speakers matches what a rational speaker, with adult-like cognitive resources, *would* do, given the input that HL speakers encounter. If so, we again have a way to predict HL knowledge – their perception of the input would be a key component of their observed learning outcomes. Below I sketch out a few instances of each developmental approach, based on the concrete examples P&S discuss of HL use.

**Comparative approaches.** In HL speakers, P&S note cases of overregularization, overly-strong tendencies compared to monolingual adults (e.g., a strengthened Subject bias when interpreting Spanish null pronouns), and non-adult interpretations (e.g., Russian verb ellipsis). Do monolingual

children show these same behaviors for these same items? If they do, we often know something about (i) how long it takes children to recover and converge on the adult behavior, and (ii) what factors are believed to determine that recovery (e.g., perceiving variation as unpredictable can cause children to strengthen a probabilistic tendency: Hudson Kam & Newport, 2009). Importantly, “how long” can often be translated into “how much data is required”. Given this, we can get more precise estimates of the input quantity necessary to support recovery from non-adult behavior in monolingual children; with reasonable samples of HL input, we can then see if this necessary quantity is typically available to HL speakers.

**Behavioral approaches.** Supportive contexts can allow children to display underlying linguistic knowledge that’s hidden when more standard experimental setups are used (e.g., see Conroy et al. (2009) for a striking asymmetry in monolingual child pronoun interpretation with vs. without supportive pragmatic context). For HL speakers, the Chinese scope-taking and Japanese topic-marking behavior may be worth investigating using child behavioral techniques. Specifically for scope ambiguity, Viau and Lidz (2011) demonstrate how supportive pragmatic context and structural priming allow monolingual children to display adult-like knowledge. Perhaps Chinese and Japanese HL speakers have more adult-like knowledge, but can’t access it without additional contextual support.

**Computational approaches.** Computational tools can be deployed when we have realistic data samples of sufficient size (e.g., from CHILDES (MacWhinney, 2000) for monolingual child interactions). With reasonable samples of HL input distributions, we could use a variety of computational tools to predict learning behavior on the basis of that input (e.g., see Pearl, in press).

More concretely, if we’re interested in why HL speakers make or don’t make certain generalizations and we have realistic input samples, we can use techniques that consider the average retrieval time (e.g., the Tolerance Principle: Yang, 2016) or required storage space (e.g., information theoretical approaches: Chater, Clark, Goldsmith, & Perfors, 2015) with vs. without the generalization. On the basis of that input, these techniques will predict whether a rational learner (who prioritizes retrieval time or storage space) would make the generalization. We can then compare this to actual HL speaker behavior.

For example, perhaps overregularization or a simpler structure is perfectly rational, given the input HL speakers encounter. This strikes me as particularly relevant for the issue of morphology perception, where HL speakers may not perceive all the morphology in the input correctly all the time – or perhaps prefer to rely on some morphology more. With noisy input, a simpler structure may well be the rational generalization. More generally, we can also use computational tools to determine whether noisy input perception or preference for some information types over others (or both) is compatible with observed behavior (see Gagliardi, Feldman, & Lidz, 2017 for a clear example of this with children).

**Closing thoughts.** I’m excited by these possibilities for better understanding what’s happening in HL speakers using developmental tools that already exist. One notable resource that may be worth

creating is a repository of HL input samples, which would enable us to deploy the computational techniques especially and provide explanatory power for how HL speakers know what they do.

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