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Providing some more pieces to the puzzle: L2 adults, L2 children and children with Specific Language Impairment

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Although the role of parsing for language acquisition has long been recognized (e.g., Fodor, 1998), empirical research on sentence processing in populations whose language abilities are still developing was sparse until about fifteen years ago when Clahsen and colleagues conducted the project 'The development of language processing'. This led to a series of influential studies on sentence processing in monolingual (L1) children (Felser, Marinis, & Clahsen, 2003a; Roberts, Marinis, & Clahsen, 2007) and adult second language (L2) learners (Felser, Roberts, Marinis, & Gross, 2003b; Felser & Roberts, 2007; Marinis, Roberts, Felser, & Clahsen, 2005) and the formulation of the Shallow Surface Hypothesis (SSH) (Clahsen & Felser, 2006). The SSH sparked controversy in L2 acquisition research and led to the explosion of language processing studies in adult L2 learners, many of which are presented in the keynote paper by Phillips & Ehrenhofer (2015) (henceforth P&E). Compared to adult L2 processing research, research on language processing in L1 children is still limited, and even more limited are studies on processing in L2 children and children with Specific Language Impairment (SLI). Research in these populations is crucial if we want to understand the role of language processing in language acquisition, which is the aim of P&E's keynote paper. In this commentary I will add some more pieces to the puzzle P&E address by reporting recent findings on the role of immersion in adult L2 processing and discussing results on language processing in L2 children and children with SLI in relation to reanalysis and predictive parsing. The paper will conclude with a note on the need to compare on-line comprehension with production.

What determines whether or not adult L2 learners reach native-like parsing

Key evidence for the SSH has been provided by studies on the processing of wh dependencies, demonstrating that highly proficient L2 learners do not process intermediate gaps (Marinis et al., 2005) and do not show reactivation of the filler at the gap (Felser & Roberts, 2007). P&E (page 8, paragraph 3) rightly point out that L2 data are noisier than L1 data and this could lead to the lack of effects and interactions in the L2 data. Noise in L2 data comes from the large individual variability in the learners' language history. Factors, like age of onset, length of exposure, proficiency, input quantity and quality are important factors contributing to individual variability (see Hulk & Marinis, 2011). On-line reaction time and ERP experiments usually employ selection criteria to narrow down the individual variability, but the number of factors to be controlled for is large and to date it is unclear which factor(s) can best predict native-like parsing in L2 learners.

Pliatsikas & Marinis (2013a,b) tested two of these factors, the type of exposure to the L2, contrasting classroom to naturalistic exposure, and the length of naturalistic exposure; the hypothesis was that L2 learners would show native-like parsing with increasing length of naturalistic exposure, based on the idea that linguistic immersion can lead to native-like syntactic processing

(Gillon-Dowens, Vergara, Barber, & Carreiras, 2010). The studies revealed that this depends on the phenomenon tested. Processing of English past tense morphology was native-like in highly proficient L2 learners irrespective of type and length of exposure (Pliatsikas & Marinis, 2013a); in contrast, processing of intermediate gaps in wh dependencies was native-like only in L2 learners with a minimum of five years of naturalistic exposure to English (Pliatsikas & Marinis, 2013b). This demonstrates that the SSH only applies to specific developmental stages and linguistic phenomena. It also highlights that it is necessary to investigate systematically the impact of internal and external factors not only on language acquisition, but also on language processing.

Parsing in L2 children and children with SLI

P&E discuss language processing research in L1 children and L2 adults. However, L1 children and L2 adults differ not only in the language acquisition type (L1 vs. L2), but also in their cognitive and non-cognitive abilities, which are developing rapidly in L1 children but not in L2 adults. Therefore, differences in parsing between L1 children and L2 adults are more difficult to interpret and less meaningful than differences between groups that differ only in one dimension, e.g., L2 adults-L2 children, L1 children-L2 children, and L1 typically developing (TD) children-L1 children with SLI. Studies on L2 children and children with SLI are also very important because they can address whether or not a late onset, limited exposure, and deficits in the language learning system lead to a qualitatively different processing system with repercussions in language acquisition.

In the last 10 years, together with colleagues at the Universities of Reading and Amsterdam, we investigated systematically language processing in primary school children (5- to 8-year olds), comparing L1 vs. L2 children and TD children vs. children with SLI. The studies addressed a range of phenomena in the verbal and nominal domain using reanalysis and grammaticality designs and addressed whether or not children can use predictive cues when they process sentences in real-time.

Comparison between L1 vs. L2 children revealed that both L1 and L2 children are sensitive to diverse predictive cues in reanalysis designs investigating the processing of actives and passives (Marinis & Saddy, 2013), pronouns and reflexives in English (Marinis, 2008); grammaticality designs addressed the processing on tense and agreement in English (Chondrogianni & Marinis, 2012), articles in English, Dutch, and Greek, and clitic pronouns in Greek (Chondrogianni, et al., 2014; 2015). Differences between L1 vs. L2 children and lack of sensitivity to predictive cues was attested only for Dutch gender but not for Greek gender (Vasić, et al., 2012), reflecting differences in the properties of the gender system in the two languages; opaque gender in Dutch results in delayed sensitivity to gender cues in L1 children and no sensitivity in L2 children, whereas transparent gender in Greek leads to sensitivity in both L1 and L2 children.

Comparison between TD children and children with SLI revealed that children with SLI are capable of using predictive cues when they process articles and gender, but not clitic pronouns in Greek and gender in Dutch (Chondrogianni, et al., 2014; Marinis, et al., under submission). Moreover, although they are sensitive to predictive cues in both actives and passives,

children with SLI fail to reanalyze their initial parses in both sentence types when there is a mismatch between a visual stimulus and the sentence they parse. This indicates that they are capable of using predictive cues to build syntactic structure in real-time, but they have difficulties to inhibit their initial parse when they encounter conflicting information from the visual and auditory modality, suggesting that comprehension difficulties may be related to deficits in inhibitory control (Henry, Messer, & Nash, 2012).

On-line Production vs. comprehension

This final issue regards the relationship between comprehension and production. P&E focus exclusively on on-line comprehension. To understand the development of language processing, it is necessary to study the interplay between comprehension and production because each modality has different demands and provides a different window into the developing system. This is what we did in most of the above mentioned studies and found asymmetries between on-line comprehension and production. Although L2 children were sensitive to predictive cues in the comprehension of tense and agreement, articles, clitics, and gender, they showed errors of omission in production (Marinis et al., under submission; Chondrogianni & Marinis, 2012; Chondrogianni, et al., 2014; 2015). This could be caused by a breakdown at one or more stages of production, such as selection, lexical access, retrieval, articulation and requires systematic investigation.

Conclusion

To conclude, this commentary has added three pieces in the puzzle of the role of language processing in language acquisition addressed in the keynote by E&P by presenting findings from three populations that were not included in the keynote paper: adult L2 learners with long naturalistic exposure to the L2, L2 children and children with SLI. All groups show evidence of using predictive cues when they process sentences in real-time, but there are important differences based on the linguistic properties of the phenomenon tested, such as opaqueness and syntactic complexity. Moreover, all typically developing groups are able to reanalyze initial parses, but children with SLI fail when they encounter conflicting information. This suggests that domain general abilities, like inhibitory control, may affect language processing with repercussions on language acquisition at least in populations with deficits in their language learning system.

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