Child and adult incidental learning of linking rules and case marking

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Introduction

In this pilot study I investigated learning of case marking and argument linking rules in the artificial language Brocanto2 (Morgan-Short, 2007) in L1 English adults and 9 year olds. Previous studies found evidence of the learning of novel word orders and the linking rules relating an NP's thematic role to its syntactic position in a new construction in both age groups (Boyd, Gottschalk & Goldberg, 2009; Morgan-Short, 2007; Wonnacott, Boyd, Thomson & Goldberg 2012; Wonnacott, Newport & Tanenhaus, 2008). Case morphology has a function similar to syntactic linking, as it encodes the thematic interpretation of an argument. However, little research to date has looked at the learning of case markers in adults (but see Grey, Williams & Rebuschat, 2014, and Rogers, Révész & Rebuschat, 2015) and to the best of my knowledge no artificial language learning research has compared case learning in adults and children.

R1: Can children and adults learn the rules linking argument realization and syntactic position in Brocanto2?

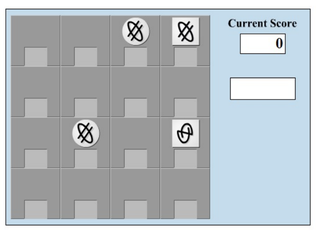
R2: Can children and adults learn the relationship between argument realization and case markers in Brocanto2?

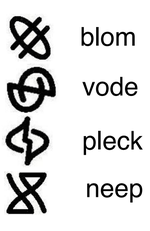
R3: Do children and adults establish a relationship between case markers and agentive vs. patient-like thematic roles beyond the game environment?

Materials and methods

Seven 9 year olds and eight adults ($M = 29$; $SD = 8.9$) were incidentally exposed to a version of Brocanto2 in the context of a computer board game similar to draughts. After vocabulary training and training in the game, the participants were shown game moves on the computer and exposed to auditory sentence stimuli that described them. The exposure (144 sentences) was distributed over six blocks and delivered over three consecutive days (B1. B2-3, B4-6). After each exposure block the participants played a computer game, which consisted in performing novel moves following an auditory description (20 sentences per block). Crucially, the case markers were included in the exposure and game stimuli, but they were not presented during the vocabulary training and participants were not given hints regarding their presence in the input, their meaning or function.

The language: The artificial language deployed was a modification of Brocanto2, displayed the word order of Japanese and had 14 items: 4 verbs (the moves), 4 nouns (the tokens' symbols), 2 adjectives (the tokens' shapes), 2 adverbs (the moves' directions) and 2 postpositional case markers (*li* for nominative and *lu* for accusative). Exposure and games included both SOV and OV sentences. The following is an example of a Brocanto SOV sentence a participant could hear associated to the game scenario below:





Troise blom li neimo blom lu zayma nim
[Round blom NOM square blom ACC across capture]
'The round blom piece captures the square blom piece horizontally'

Measures: **(1)** A comparison of how each move was performed (reports were automatically generated by the program) with the corresponding auditory stimuli provided a continuous measure of the development of the learners' comprehension of the argument linking rules across blocks. The level of chance performance was calculated using conditional probability based on B1 and B2 items and found to be 7% overall (operationalized as 2 items correct per block), and 14% for argument linking; **(2)** Forced-choice task 1: Participants were shown 12 novel moves in Brocanto and asked to point at one of two tokens after hearing *li* or *lu*; **(3)** Forced-choice task 2: Participants were shown images matching the semantics of the verbs used in Brocanto2 and depicting transitive actions involving an agent and a patient character/element and were asked to point at one of the two after hearing *li* or *lu*.

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Results

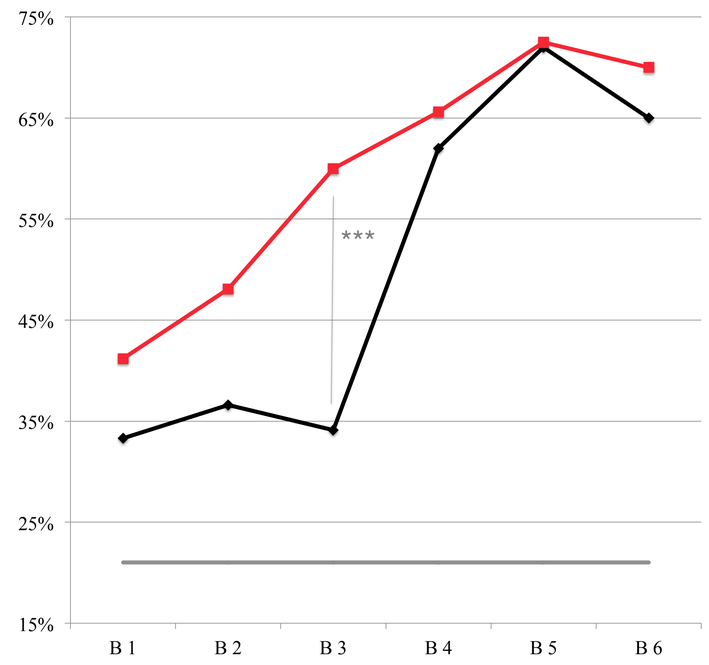

Figure 1. Overall performance (accuracy) across blocks. Sig. difference: Block 3, χ^2 (1) = 21.07, p =.000, Φc = .257.

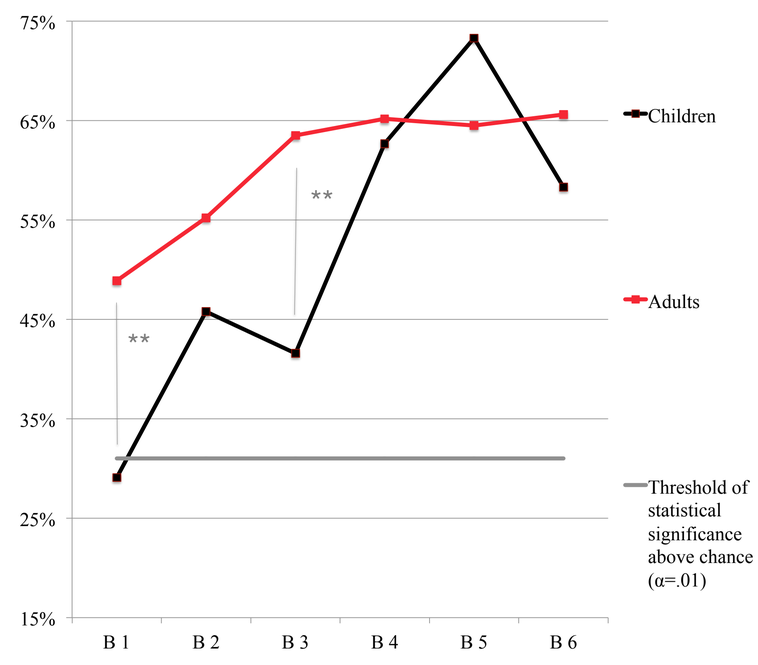

Figure 2. Accuracy based on evidence of correct linking (symmetrical moves). Sig. differences: Block 1, χ^2 (1) = 7.89, p =.008, Φc = .203; Block 3, χ^2 (1) = 9.21, p =.004, Φc = .219.

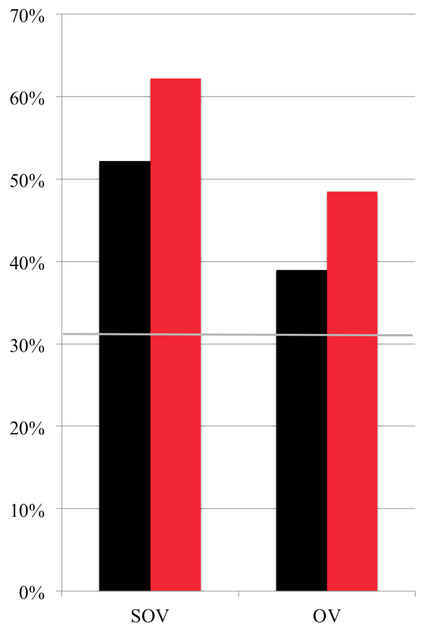

Figure 3. Linking-rule accuracy per sentence type. Both groups performed significantly above chance in SOV and OV sentences and no significant between-group differences emerged.

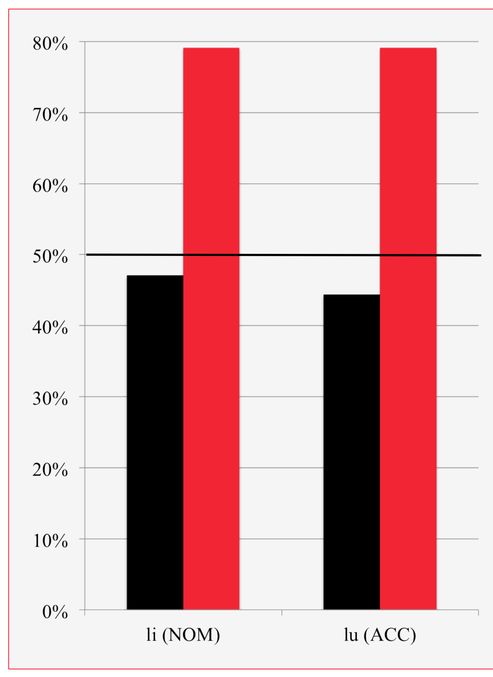

Figure 4. Accuracy in the association of case markers and tokens in game scenarios (forced-choice task 1). Adults were sig. better than chance and better than children, χ^2 (1) = 20.06, p =.000, Φc = .346.

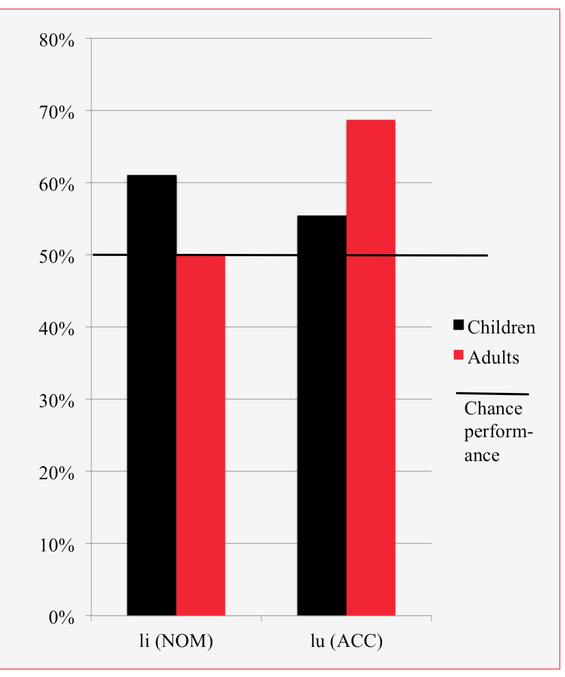

Figure 5. Accuracy in the association of case markers and pictures (forced-choice task 2). Adults were marginally sig. better than chance in associating *lu* with a patient role, χ^2 (1) = 4.04, p =.060, Φc = .206.

Conclusions

1. The study found that both children and adults performed significantly above chance on the argument linking rules of both SOV and OV Brocanto2 sentences. Paralleling the curve of overall performance in the game, adult argument linking performance was significantly higher in the initial training phase, though the between-group gap disappeared by session 3.

2. The fact that participants correctly identified the object role in OV sentences significantly above chance (children: χ^2 (1) = 9.51, p =.004, Φc = .300; adults: χ^2 (1) = 28.25, p =.000, Φc = .401) is particularly interesting because it provides evidence that the case marker was a genuine cue for argument interpretation and that linking rules did not simply rely on a general principle of subject prominence.

3. When participants heard the case markers in isolation in game scenarios, only adults performed significantly above chance in pairing them to the correct tokens. This could possibly be related to the fact that, unlike children, adults made explicit hypotheses about the meaning and function of individual case markers during training, as emerged from final verbal reports (see also Bell, 2015).

4. Finally, the study did not find significant evidence of an extension of the thematic association of *li* and *lu* in non-gaming contexts.

Selected references

Bell, K. (2015). The role of personality and learning styles in the acquisition of second language morphology. MA Dissertation. Lancaster University

Boyd, J. K., Gottschalk, E. A., & Goldberg, A. E. (2009). Linking Rule Acquisition in Novel Phrasal Constructions. *Language Learning*, *59*, 64–89.

Grey, S., Williams, J., & Rebuschat, P. (2014). Incidental Exposure and L3 Learning of Morphosyntax. *Studies in Second Language Acquisition*, 1-34.

Morgan-Short, K. (2007). A neurolinguistic investigation of late-learned second language knowledge: The effects of explicit and implicit conditions. Ph.D dissertation, Georgetown University.

Wonnacott, E., Boyd, J. K., Thomson, J., & Goldberg, A.E (2012). Input effects on the acquisition of a novel phrasal construction in 5 year olds. *Journal of Memory and Language*, *66*(3), 458 – 478.

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