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Simple vs. complex transitive constructions in the acquisition of English structures

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Abstract. This study examines the acquisition of English simple monotransitive and complex dative alternation (DA) structures (double object constructions (DOC) and *to/for*-datives) in the longitudinal spontaneous production of monolingual children. In order to address these issues, we analyzed data from twelve English monolingual children and from adults' child-directed speech, as available in CHILDES (MacWhinney, 2000). The findings revealed that simple monotransitive constructions started being produced earlier and showed a higher incidence when compared to complex DA constructions, which suggests that the degree of syntactic complexity has had an effect on the acquisition of transitives. However, the two complex DA constructions emerged at an approximately similar age, which could be explained by the Case assigning related properties. Furthermore, the chronological progression and the difference regarding the incidence of the three constructions (monotransitives > DOCs > *to/for*-datives) could be attributed to the amount of exposure to these structures in the adult input.

Palabras clave: English monotransitives; English dative alternation; monolingual acquisition; adult input

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1. Introduction

This study aims to shed light on the acquisition of simple monotransitive constructions (1) when compared to complex dative alternation (DA) structures, namely, double object constructions (DOCs) (2a) that alternate as *to*-datives (2b), and DOCs (2c) that alternate as *for*-datives (2d). These transitive constructions will be analyzed in monolingual children's longitudinal spontaneous production data and the adults that interact with them, as it appears in CHILDES (CHIld Language Data Exchange System; MacWhinney, 2000).

(1) I have milk

[monotransitive, Naomi, 1;11, the Sachs corpus, CHILDES][2]

(2) a. Give me candy

[DOC, Nina, 2;01, the Suppes corpus, CHILDES]

b. I give that to you

[*to*-dative, Nina, 2;01, the Suppes corpus, CHILDES]

c. I will make you another man

[DOC, Adam, 4;03, the Brown corpus, CHILDES]

d. I am not gonna drill no hole for him

[*for*-dative, Adam, 4;02, the Brown corpus, CHILDES]

The degree of syntactic complexity (that is, simple *vs.* complex structures) was measured on the basis of the argumenthood and the general defining properties that characterize and differentiate simple monotransitive from complex DA structures in English (Abbot-Smith & Tomasello, 2006; Aranovich, 2012; Radford, 1990).

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[2] The bracketed information provided next to each example from CHILDES (MacWhinney, 2002) will specify (a) the structure type produced; (b) the child's name; (c) the age at which the construction was uttered using the pattern "years;months"; and (d) the corpus where the utterance was extracted.

English DA has been considered as an instance of complex predicate structures. Following Snyder (2001), complex predicates involve a verb that combines with a secondary predicate and the two constituents from a new expression that is semantically related to a single verb (e.g., Larson, 1990). Alternatively, other approaches propose the verbal selection of a small clause (SC) that hosts the internal argument structure of DOCs and *to/for*-datives (e.g., Aoun & Li, 1989).

In the case of the DA constructions (2a-b), DOCs and *to*-datives can occur in the case of the ditransitive constructions where the verb 'give' subcategorizes for the direct objects (DO) 'candy' (2a) and 'that' (2b) and the indirect objects (IO) 'me' (2a) and 'to you' (2b). As for the DA constructions (2c-d), they are monotransitive structures in which the verbs 'make' and 'drill' select the DO 'another man' and 'no hole', respectively, as it is also the case of the simple monotransitive (1) with the verb 'have'. Unlike simple monotransitive constructions, the DA constructions (2c-d) are followed by the adjunct (A) 'you' and 'for him', respectively, that is not part of the verbal subcategorization. Thus, the alternating properties of DOCs as *for*-datives provide these two constructions with a higher degree of syntactic complexity that simple monotransitive constructions (1) do not present.

Snyder (2001) establishes that complex predicates involve the constructions in (3) and argues that they all form a natural syntactic class with a shared parametric property. As will be discussed in section 3, Snyder (2001) lends support to this analysis with monolingual acquisition data and children acquire the structures in (3) as a group, namely, as soon as a child acquires one of these constructions, the others emerge immediately later.

(3) a. John painted the house red   [resultative]
     b. Mary picked the book up/picked up the book   [verb-particle]
     c. Fred made Jeff leave   [*make*-causative]
     d. Fred saw Jeff leave   [perceptual report]
     e. Bob put the book on the table   [*put*-locative]
     f. Alice sent the letter to Sue   [*to*-dative]
     g. Alice sent Sue the letter   [double-object dative]

                                                                                                [Snyder, 2001: 325]

Out of the complex predicates in (3), the present study analyzed the structures in (3f-g), namely, *to*-datives and double-object datives (or DOCs, as termed in the present work). The verb 'sent' selects the DO 'the letter' and the IO-prepositional phrase (PP) 'to Sue' headed by the preposition '*to*'. In DOCs, the linear order of the internal argument structure is reversed from that of *to*-datives, namely, the IO occupies a postverbal position and takes a determiner phrase (DP) form, followed by the DO-DP.

Snyder's (2001) taxonomy does not consider *for*-datives as complex predicates. However, these structures show an analogous pattern with *to*-datives in that both undergo DA as DOCs (Goldberg, 2006; Larson, 1990). As in (4a), the verb 'drill' selects the DO-DP 'no hole', along with the A-PP 'for him' in *for*-datives, and the same DO-DP preceded by the A-DP without being headed by the preposition '*for*' in DOCs. As discussed earlier, *for*-datives that alternate as DOCs are monotransitive constructions since the adjunct-PP 'for him' (4a) or the adjunct-DP 'him' (4b) are optional and cannot render the sentence ungrammatical when it is not overtly realized (4c). Although DOCs that alternate as *for*-datives are monotransitive constructions, the present study will consider these two structures at stake as complex predicates (Snyder, 2001; Snyder & Stromswold, 1997) since their alternating properties are akin to those ones between *to*-datives and DOCs.

(4) a. I am not gonna drill no hole for him

                                                                [*for*-dative, Adam, 4;02, the Brown corpus, CHILDES]

     b. I am not gonna drill him no hole

                                                                                                            [DOC]

     c. I am not gonna drill no hole

                                                                                                [monotransitive]

Therefore, the present study distinguished simple monotransitive structures from complex DA constructions in terms of the degree of syntactic complexity. This was measured by means of the number of arguments that the verbal head selects, as well as the Case marking properties that the internal argument structure of the target constructions exhibits. In order to elucidate how these structures are acquired, we examined the longitudinal spontaneous production of English monolingual children by comparing the emergence and the use through language development across the two groups of participants (child output and adult's speech).

The characterization of simple monotransitive and complex DA constructions was also investigated in the children's output and in the adult input so as to shed light on whether the relative frequency with which simple and complex structures are used by adults plays a role in the English monolingual children's acquisition and output of these constructions.

The remainder of this paper is divided into the following sections. Section 2 defines simple monotransitive and complex DA constructions and considers the distribution of the internal argument structure from the approach of

Case Theory. Section 3 offers a review of earlier empirical studies on the monolingual acquisition of English monotransitive and complex DA constructions. Section 4 includes the working research questions of the study (RQs). Section 5 addresses the methodology and presents the selection of English monolingual corpora (section 5.1) as well as the description of how simple monotransitive and complex DA constructions have been selected, coded and classified (section 5.2). After the discussion of the statistical tests run for data analyses (section 5.3), we present the analysis (section 6) and the discussion of results (section 7). Section 8 presents the conclusions drawn from the data analyses and suggestions for future research.

2. On the argumenthood and case filter of simple monotransitive and complex dative alternation structures

Case is a language phenomenon that is morphologically visible via inflections or particles in the case of German or Japanese, respectively. However, although there are languages such as English in which Case morphology on nominal expressions is not typically overt, they also satisfy the Case Filter requirements (Chomsky, 1986) in order to guarantee the distribution of overt nominal expressions in a clause or in a phrase.

Case is assigned to nominal arguments under government conditions so as to mark their syntactic functions (for instance, subject (SU), DO, IO or prepositional complement). That is, a nominal argument X governs a nominal argument Y if and only if (a) X is a head; (b) X c-commands Y (that is, if a head X is an immediate adjacent complement to Y); (c) there is no intervening governor of Y such that X c-commands the governor of Y; and (d) X is a governor, as it is the case of prepositions, tense or verbal inflections and verbs.

Regarding the constructions analyzed in the present study, simple monotransitive structures differ from complex DA constructions in the distribution of the nominal arguments selected by the verb. In the case of the former (5), the verb 'have' assigns accusative (acc.) Case to the DO 'milk' and the verbal inflection (or tense) assigns nominative (nom.) Case to the SU 'I'.

(5) I   have   milk
     nom.   acc.

                           [monotransitive, Naomi, 1;11, the Sachs corpus, CHILDES]

As far as complex DA constructions are concerned, *to/for*-datives and DOCs also meet the Case Filter conditions. Their internal structure is assigned analogous Cases, namely, the SU-DP, the internal DO-DP and IO-DP arguments of DOCs that alternate as *to*-datives are assigned nominative, accusative and dative Cases by the verbal inflection, by the verb and by the preposition 'to', respectively. Regarding DOCs that alternate as *for*-datives, the SU-DP, the DO-DP and the A-DP are assigned nominative, accusative and dative Cases by the verbal inflection, by the verb and by the preposition '*for*', respectively.

In the case of *to/for*-datives (6b) and (6d), the verbs 'give' and 'drill' assign accusative Case to their adjacent DO-DPs 'that' and 'no hole', respectively. The prepositions '*to/for*' assign dative Case to their adjacent prepositional complement 'you' and 'him', respectively.

(6) a. Give [SC   me   (*e*)   candy]
                  acc.   inh. Acc.

                              [DOC, Nina, 2;01, the Suppes corpus, CHILDES]

    b. I   give   that   to   you
        nom.   acc.   dat.

                            [*to*-dative, Nina, 2;01, the Suppes corpus, CHILDES]

    c. I   will make   [SC you   (*e*)   another man]
        nom.   acc.   inh. acc.

                            [DOC, Adam, 4;03, the Brown corpus, CHILDES]

    d. I   am not gonna drill   [SC no hole   (*e*)   for   him]
        nom.   acc.   dat.

                            [*for*-dative, Adam, 4;02, the Brown corpus, CHILDES]

Initially, DOCs (4a) and (4c) violate the Case Filter requirements and, more specifically, the Case assignment of the DO-DPs. This seems to be the case since while the verbal heads 'give' and 'drill' assign accusative Case to their adjacent IO-DP 'me' and A-DP 'you', respectively, the DO-DPs 'candy' and 'another man' do not have a Case assigner from which they can be assigned Case. In order to shed light on this issue, two approaches have been proposed so that the DO-DPs can satisfy the Case Filter requirements of DOCs.

Radford (1990) proposes null categories (*e*) as the Case assigning governors that assign inherent accusative Case to the adjacent DO-DP in a SC domain (4a-c). This assumption is argued in the Proper Antecedent Condition, which states that null categories can function as Case assigners when they have a preceding Case assigning governor that

exhibits the same status as the null category. Therefore, the DO-DPs 'candy' (4a) and 'another man' (4c) are assigned inherent accusative Case by the null verbal head in the SC domain given that it has a proper verbal antecedent, namely, 'give' and 'make', respectively, that assigns accusative Case to their adjacent DO-DPs.

Contrastingly, Larson (1990) proposes that the verbal head of DOCs base-generates in a lower verbal phrase (VP)-shell domain and moves to a higher VP-shell domain by means of V-Raising so as to assign (structural) accusative Case to their adjacent IO-DP 'me' (7a) and A-DP 'you' (7b) by the verbs 'give' and 'make', respectively. The inherent accusative Case assignment to the DO-DPs 'a candy/another man' is done by means of V' Reanalysis, as licensed by the adjacent complex transitive predicate $[[_V t_i] t_j]$.

(7)   a. $[_{VP} [_{V'} \text{Give}_i [_{VP} \text{me}_j [_{V'} [_V t_i] t_j] [\text{a candy}]]]$
                  acc.   inh. acc.

      b. I $[_{VP} [_{V'} \text{will make}_i [_{VP} \text{you}_j [_{V'} [_V t_i] t_j] [\text{another man}]]]$
        nom.   acc.   inh. acc.

[adapted from Larson, 1990: 617]

This means that V' Reanalysis triggers the IO/A to undergo DP-movement to be assigned accusative Case by the verb once the verb has undergone V-to-V movement. Therefore, the IO and the A are discharged given that movement causes them to leave a trace (t_i) in their base position. In turn, since the lowest V' has one unsaturated theta role, (namely, the DO-DP 'candy/another man'), this is the rationale that explains the recategorization of the lowest V' as a complex transitive predicate. Thus, the complex transitive verb inherits the Case assigning properties of the corresponding verbal heads (7a-b).

Regardless of whether the Case assignment to the DO-DP in DOCs is accounted for via the Proper Antecedent Condition (Radford, 1990) or the V' Reanalysis (Larson, 1990), Case Filter conditions are satisfied for both internal DPs.

3. On the acquisition of simple monotransitive and complex dative alternation constructions

There is not a great bulk of studies that have investigated how English monolingual children acquire simple monotransitive constructions when compared to complex DA structures. In fact, only Campbell and Tomasello (2001) observed a monotransitive-like use of DOCs and *to/for*-datives, as analyzed in the spontaneous production of 7 English monolingual children (age range: 1;02-5;01) from CHILDES (MacWhinney, 2000). More specifically, most of the verbs that were produced in the DA started being used as simple monotransitive structures (8). This was true in the children's data analyzed even though the frequency of exposure to these constructions in the adult input displayed the two overtly realized postverbal arguments.

(8)   I through this

[monotransitive, Campbell & Tomasello, 2001: 264]

These findings suggest that English monolingual children's emergence of simple monotransitive constructions occurs earlier than that of complex DA structures. This could be explained by the fact that the latter are more cognitively complex and involve a more complex syntactic structure.

As illustrated in Table 1, earlier works that have examined the acquisition of English monolingual children's simple monotransitive constructions observed that these structures are not acquired until 3;00-4;00, as reported by experimental studies (e.g., Matthews, Lieven, Theakston & Tomasello, 2005; Pinker, Lebeaux & Frost, 1987).

Table 1. Mean age of the onset of English monotransitive in monolingual experimental works

Empirical works	Monotransitive
Abbot-Smith, Lieven and Tomasello (2008)	4;00
Akhtar (1999)	4;00
Akhtar and Tomasello (1997)	3;05
Chan, Meints, Lieven and Tomasello (2010)	2;09-3;05
Matthews, Lieven, Theakston and Tomasello (2005)	3;09
Meints, Plunkett and Harris (2008)	3;00
Pinker, Lebeaux and Frost (1987)	3;00-4;00

All the works in Table 1 agree that the acquisition of these structures occurs gradually through language development and they become available in the child's grammar as a result of the language exposure in the adult input. These findings are in line with usage-based models (e.g., Matthews *et al.*, 2005). There are no empirical works that have attested the acquisition of these constructions in child spontaneous production data.

With regards to experimental studies, Slobin and Bever (1982) found that English monolingual children do not show consistent comprehension of the (S)-object (O)-verb (V) constituent order at 2;00. These results suggest that the acquisition of these structures depends on the interpretation and the integration of semantic cues for these structures to become fully productive. It is not until English monolingual children become 3;00-4;00 when they show an adult-like grammatical knowledge of the SVO pattern (e.g., Chan, Meints, Lieven & Tomasello, 2010; Matthews *et al.*, 2005 with real verbs; Abbot-Smith, Lieven & Tomasello, 2006; Akhtar, 1999; Meints, Plunkett & Harris, 2008; Pinker, Lebeaux & Frost, 1987 with novel verbs). Similar findings were seen in Akhtar and Tomasello's (1997) work since English monolingual children aged 3;05 and older used novel verbs (i.e., *meek* and *tam*) in a monotransitive construction whereas younger children never used these new verbs transitively.

Matthews *et al.* (2005) examined 96 English monolingual children in two age groups (2;09 and 3;09). They were shown videos that described events modelled in the ungrammatical SVO constituent order (*push*, *ram*, *shove*) and were elicited to describe the event enacted. Findings revealed that while children aged 2;09 who were exposed to low frequency verbs significantly adopted the ungrammatical word order when compared to high frequency verbs ($X^2 = 14$, *d.f.* = 2, *p* < 0.001), children aged 3;09 were more productive and preferred the use of SVO constituent order, regardless of the frequency of the verb they were exposed to ($X^2 = 1.2$, *d.f.* = 2, *p* < 0.056).

Other experimental studies have also investigated the English monolingual children's productivity of the simple monotransitive syntactic pattern with novel verbs. Akhtar (1999) introduced 2;00, 3;00 and 4;00 children to novel verbs (*dacking*, *gopping* and *tamming*), modelled in three syntactic patterns, namely, SVO (9a), SOV (9b) and VSO (9c). While 4;00 children preferred using the SVO constituent order with the three novel verbs (96% of the time), the younger age groups used both the ungrammatical SOV and VSO constituent orders and the grammatical SVO constituent order in that they switched the ungrammatical utterances to grammatical ones.

(9) a. Elmo dacking the car
    b. Elmo the car gopping
    c. Tamming Elmo the car

[Akhtar, 1999: 344]

Regarding the English monolingual children's age of onset of complex DA constructions, earlier empirical works have reported an earlier onset of DA constructions at around the age of 2;00 when compared to that of monotransitive structures (see Table 1). As displayed in Table 2, DOCs started being produced earlier than *to/for*-datives, as analyzed in the longitudinal spontaneous production of child monolingual data available in CHILDES (MacWhinney, 2000).

Table 2. Mean age of onset of English complex dative alternation in monolingual empirical works

Empirical works	DOCs	*to/for*-datives
Campbell and Tomasello (2001)	2;02	2;04
Gropen, Pinker, Hollander, Goldberg and Wilson (1989)	2;06	2;07
Snyder and Stromswold (1997)	2;02	2;06

Although an order effect was found in the onset of English complex DA, Snyder and Stromswold (1997) reported that DOCs and *to*-datives emerged at around the age of 2;00 (*r* = .76, *p* = .0043). These data are explained by the shared grammatical property (or Property A) between the two structures as complex predicates. Nevertheless, the later onset of *to*-datives when compared to DOCs (*t*(11) = 4.15, *p* = .002) is argued to be related to an additional property (or Property B) that accounts for the dative Case mediated assigning property of the preposition by means the verb onto the DP (Larson, 1990). This is seen in the significant correlation (*r* = .83, *p* = .0009) between the onset of *to*-datives and other dative structures such as dyadic *to*-datives at 2;06.

As for the role played by adult input in child output, usage-based approaches to language acquisition (Abbot-Smith & Tomasello, 2006; Bybee & Hopper, 2001; Tomasello, 2003) argue that the frequency with which syntactic constructions are heard in the adult input is crucial for their acquisition and language use and, thus, relatively high frequency structures would play a role in the children's building of grammatical patterns. These models contrast with nativist theories that assume the biological representation of syntactic structures (Chomsky, 1986).

Earlier works have reported that children hear simple monotransitive structures highly frequent, as it was the case of Cameron-Faulkner, Lieven and Tomasello's (2003) findings on the use of British mothers' production of around

70 declarative full active monotransitive utterances on average per hour. Evidence was also seen in Akhtar's (1999) study in that 4;00 children use Case-marked pronouns roughly 50% of the times when correcting the ungrammatical SOV or VSO orders to the grammatical SVO order with real verbs, in contrast to the use of full DPs when using a novel (non-adult-like) monotransitive constituent order. Thus, high frequency syntactic elements boost emerging grammatical schemas, and this was the case of English monolingual children's production of monotransitive constructions with pronominal forms since they were highly frequent in the adult input (Cameron-Faulkner *et al.*, 2003) when compared to their argument realization as full DPs (Akhtar, 1999). As discussed earlier, similar findings were seen in Matthews *et al.*'s (2005) study since English monolingual children aged 2;09 corrected highly used monotransitive verbs (*pull* and *push*) to SVO order when compared to medium frequency (*drag* and *shove*) and low frequency (*run* and *tug*) verbs.

Previous works on English monolingual children have drawn opposing results with regard to the role played by adult input in child output. Most of these studies reported that the amount of exposure to a syntactic structure from the adult input has an effect on the children's output (Legate & Yang, 2002; Yang, 2016). To set an example, Campbell and Tomasello (2001) observed that adults show a preference for the use of DOCs (mean = 65.7%) when compared to *to*-datives (mean = 34.3%), and these findings correlated with the English monolingual children's output ($p < .01$) regarding the relatively higher rates in the production of DOCs (mean = 68%) and *to*-datives (mean = 32%). However, Snyder and Stromswold (1997) observed that the relatively higher amount of exposure to DOCs (mean = 73.2%) and *to*-datives (mean = 26.8%) with the verb '*give*' in the adults' speech did not significantly correlate ($p > .10$) with the earlier onset of DOCs (mean age = 2;02) when compared to *to*-datives (mean age = 2;06) in the English monolingual children's data.

4. Research questions

Considering earlier formal accounts (section 2) and empirical studies (section 3) as a starting point, two RQs have been formulated. They seek to elucidate the acquisition of simple monotransitive and complex DA constructions, as analyzed in the English monolingual children's longitudinal spontaneous production data.

RQ 1 investigates the English monolingual children's acquisition of simple monotransitive and complex DA structures, as observed in the ages of onset and in the incidence through language development.[3]

RQ 1. Is there any difference regarding the acquisition of simple monotransitive structures and complex DA constructions, as analyzed in the English monolinguals' spontaneous production data?

Based on RQ 1, the English monolingual children's data could reflect that simple monotransitive constructions may show a significantly earlier emergence when compared to complex DA given their simplicity in terms of the distribution of Case-marked arguments selected by the verb, in line with the Case Filter (Chomsky, 1986) requirements. This would entail that DOCs and *to/for*-datives are expected to show a later onset given their greater syntactic complexity. When comparing the two complex DA constructions, two potential findings may arise in the English monolingual children's data, namely, (a) DOCs and *to/for*-datives could reflect a similar emergence, suggesting that English DA constructions show similar Case and argumenthood underlying properties, as per the Case Filter; or (b) DOCs or *to/for*-datives could show an order effect in their emergence, suggesting that the distribution of Cases and the argumenthood of the two constructions do not play a role and, rather, other factors may play a role such as the syntactic relationship between the two constructions (Sánchez Calderón, 2018; Sánchez Calderón & Fernández Fuertes, 2018).

Based on the predictions stated earlier, we expect simple monotransitive structures to be acquired earlier than complex DA given the number of arguments selected by the verb. That is to say, while one external argument and one internal argument are selected by the verb in monotransitive constructions, three arguments (one external and two internal) are selected by the verb in DOCs that alternate as *to*-datives. Although DOCs that alternate as *for*-datives are monotransitive constructions (see section 1), they show an analogous degree of syntactic complexity when compared to DOCs that alternate as *to*-datives given the similar DA properties in their internal argument structure. These predictions are contrary to the findings reported in earlier empirical works (e.g., Matthews *et al.* 2005 for monotransitives; Snyder & Stromswold, 1997 for DA). Furthermore, DOCs and *to/for*-datives are expected to show a similar emergence since the two constructions have been argued not to be syntactically derived from one another (Sánchez Calderón, 2018; Sánchez Calderón & Fernández Fuertes, 2018). Despite their rather similar ages of onset, *to/for*-datives are also expected to show a delay in their emergence when compared to DOCs given the additional Case properties of the prepositions (Snyder & Stromswold, 1997).

We also explore in RQ 2 whether the relative amount of exposure to simple monotransitive and complex DA in the adult input goes hand in hand with the English monolingual children's output (Akhtar, 1999; Legate & Yang, 2002; Matthews *et al.*, 2005; Yang, 2016).

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[3]   Following Snyder and Stromswold (1997), the age of onset (that is, the age of first use) has been considered as a measure of acquisition for the three constructions under analysis (simple monotransitive, DOC and *to/for*-dative).

RQ 2. Does the relative amount of exposure to simple monotransitive and complex DA constructions in the adult input have an effect on the English monolingual children's output?

Considering earlier empirical works, we expect adults to reflect relatively higher frequency rates in the use of simple monotransitive constructions when compared to complex DA structures since the former are reported to be highly frequent in the children's output and in the adult input (Akhtar, 1999; Cameron-Faulkner *et al.*, 2003). In turn, we also expect DOCs to show relatively higher frequency rates of use when compared to *to/for*-datives (e.g., Campbell & Tomasello, 2001).

In order to provide an answer to the two RQs, the following sections will discuss the methodology that has been used in the present study, the data analysis and the discussion of results of the constructions at stake, as analyzed in English monolingual children's data.

5. Methodology

5.1. Corpora selection from the CHILDES database

As shown in Table 3, seven corpora have been selected from CHILDES (MacWhinney, 2000), an online open access database (https://childes.talkbank.org/). The data selection of this study included the longitudinal spontaneous production of English monolingual children ($N = 12$; n = seven girls and n = five boys).

Table 3. Selected English monolingual corpora

Corpora	# files examined	Child	Age range
Brown	55 [020304.cha]-[050212.cha] 20 [010600.cha] to [020300b.cha] 129 [020305.cha] to [050106.cha]	Adam Eve Sarah	2;03-4;10 1;06-2;03 2;03-5;01
Cruttenden	21 [010517.cha] to [030718.cha] 21 [010517.cha] to [030618b.cha]	Jane and Lucy	1;05-3;07
Lara	20 [010913.cha] to [030325.cha]	Lara	1;09-3;03
MacWhinney	292 [010411a.cha] to [070802.cha] 292 [010411a.cha] to [070802.cha]	Mark Ross	0;07-5;06 0;06-8;00
Sachs	83 [010229.cha] to [040903.cha]	Naomi	1;01-5;01
Suppes	52 [011116.cha] to [030321.cha]	Nina	1;11-3;11
Wells	10 [010521.cha] to [050024.cha] 9 [010606.cha] to [040905.cha] 10 [010526.cha] to [040901.cha]	Benjamin Gerald Jack	2;03-5;00 1;06-4;09 1;05-4;09

Data were audio-recorded and transcribed in the CHAT (Codes for the Human Analysis of Transcripts) format for CHILDES. The analysis of results was carried out on the transcribed data. Although child data varied among the corpora selected, the participants' selection was balanced and homogeneous, namely, the children's longitudinal production occurred in spontaneous naturalistic contexts; and the selected children did not show speech or hearing disabilities. The children's ages ranged from 0;06 to 8;00. The complete record of the children's transcribed data in the home setting and in interaction with their parents (mainly) were freely available online through the CHILDES database.

Child-directed speech or adult input has also been taken into consideration. Although parents were the chief input source, other caregivers (aunts, grandparents, uncles) and researchers were also sources for the children's language exposure.

5.2. Data selection and codification criteria

Data were selected manually and automatically by means of the use of the KWAL program (Key Word And Line) designed for data extraction from CHILDES. More specifically, KWAL was used to conduct automatic morphosyntactic data searches for the linguistic contexts in which the keyword verb, tagged as 'v*', was used by the children and by the adults selected. The KWAL search was only conducted for those selected corpora that had a morphological tier (+t%mor) in their CHAT transcripts, except for the Lara corpus which did not have a morphology line. The KWAL syntax line used was as follows: kwal +t*CHI +t%mor +s"v*" -w2 +w2.[4]

When conducting a KWAL search, the utterances were not distinguished in terms of the number of arguments selected by the verb (e.g., DA, intransitives, monotransitives, among others). The KWAL output was manually culled out for the analysis of the target constructions. In the case of simple monotransitive structures, we selected declarative and imperative utterances with a (S)VO order (10), that is, those ones in which the verb selects an external SU (in the former) and an internal DO.

(10) I like grapes

[monotransitive, Jane, 1;11, the Cruttenden corpus, CHILDES]

The codification of English complex declarative and imperative DA constructions included *to*-datives (11a) that alternate as DOCs (11b), as well as *for*-datives (11c) that alternate as DOCs (11d).

(11) a. Throw that to birdies

[to-dative, Jane, 2;04, the Cruttenden corpus, CHILDES]

    b. Give me your hand

[DOC, Jane, 1;11, the Cruttenden corpus, CHILDES]

    c. Mummy, make more toast for me

[for-dative, Jane, 2;04, the Cruttenden corpus, CHILDES]

    d. You buy me a motorbike one day

[DOC, Jane, 3;00, the Cruttenden corpus, CHILDES]

The codification of simple monotransitive and complex DA constructions was done for both the manual search and the automatic KWAL search, and in both the adult input and the child data.

Longitudinally, the use of simple monotransitive and complex DA was analyzed in terms of fourteen age groups with intervals of six and five months that ranged from age 0;06-0;11 (age group 1) to age 7;00-7;06 (age group 14), as illustrated in Table 4. Our starting point for these fourteen age groups was the five linguistic stages in child language development (e.g., Rowland, 2014) and they were divided considering the children's age range, that is, from 0;06 to 8;00.

Table 4. Age groups for the study of English simple and complex structures

Age group	Age range	Age group	Age range
1	0;06-0;11	8	4;00-4;06
2	1;00-1;06	9	4;07-4;11
3	1;07-1;11	10	5;00-5;06
4	2;00-2;06	11	5;07-5;11
5	2;07-2;11	12	6;00-6;06
6	3;00-3;06	13	6;07-6;11
7	3;07-3;11	14	7;00-7;06

Ages following age group 14 were not considered for the data analysis since the three target constructions were not produced by English monolingual children after 7;06. Moreover, as we focused on the ages of onset of simple monotran-

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[4]   The KWAL syntax line shows (a) the name of the program (KWAL); (b) the participants under analysis (+t*CHI indicates the child); (c) the morphology dependent tier where the data search was run (+t%mor) given that the participants' data were morphologically coded; (d) the lines to be searched (namely, the verb) and that included any verbal tense, as marked with an asterisk (+s"v*"); (e) the additional linguistic context to be output, namely, the two utterances preceding (-w2) and following (+w2) the participants' target utterance in which the keyword "v*" was shown; and (f) the analyzed filed in the corpora selected (@).

sitive and complex DA constructions and provided that by age 5;00, all children have developed the basic grammatical properties of the language they are acquiring (Peccei, 1999), we established 7;06 as the final age of the study period.

5.3. Statistical tests used for data analyses

The parametric two-tailed paired-sample *t*-test was run via the SPSS (Software Package for the Social Sciences) to investigate whether the ages of onset of simple monotransitive and complex DA could shed light on the order effect in their acquisition given the differences in the argumenthood among the three constructions. We also explored whether the emergence of the two English DA structures could elucidate the acquisition of the analogous Case marking properties between DOCs and *to/for*-datives. Data collected showed a normal distribution and homogeneity of variance was assumed.

In particular, this statistical test was run to compare the ages of onset between (a) simple monotransitive utterances and complex DOCs; (b) simple monotransitive utterances and complex *to/for*-datives; and (c) complex DOCs and complex *to/for*-datives.

6. Analysis of results

As shown in Table 5, there was an order effect with regard to the earlier onset of simple monotransitive constructions (mean age = 1;08) when compared to complex DA. The latter also showed an order of emergence regarding the earlier onset of DOCs (mean age = 2;02) when compared to *to/for*-datives (mean age = 2;06).

Table 5. Age of onset by English monolinguals

Children	Simple structures	Complex dative alternation structures	
	Monotransitives	DOCs	*to/for*-datives
Adam	2;03	2;04	2;11
Benjamin	1;05	2;03	-
Eve	1;06	1;08	1;11
Gerald	1;08	-	2;11
Jack	1;05	2;02	-
Jane	1;11	1;11	2;06
Lara	1;11	2;06	2;04
Lucy	1;08	2;07	2;00
Mark	0;11	2;06	2;09
Naomi	1;10	2;01	2;11
Nina	1;11	2;01	2;01
Sarah	2;05	2;09	3;02
Ross	1;04	1;04	2;06
Mean	1;08	2;02	2;06

As for the age range of onset, English monolingual children began to produce simple monotransitive constructions between 0,11 and 2;05, complex DOCs started being produced between 1;04 and 2;09, and the onset of complex *to/for*-datives ranged from 1;11 to 3;02.

As displayed in Table 5, all the participants showed an earlier onset of simple monotransitive constructions when compared to DA structures. However, seven of the thirteen English monolingual children selected displayed an earlier emergence of DOCs when compared to *to/for*-datives, and three children produced one of the two English complex DA structures, namely, Benjamin and Jack only produced *to/for*-datives and Gerald only produced DOCs.

In line with the order effect in the emergence between simple monotransitive and complex DA structures, statistically significant differences were observed between the earlier emergence of the former when compared to DOCs ($t(10) = -5.804$, $p = .000$) and when compared to *to/for*-datives ($t(11) = -3.581$, $p = .004$), as evidenced by the parametric two-tailed paired-sample *t*-test. Nonetheless, statistically significant differences were not observed when the ages of onset were compared in the two complex DA constructions ($t(9) = -2.089$, $p = .066$) since DOCs began to be produced earlier than *to/for*-datives.

Although the ages of onset of English DA constructions were not statistically significant in that their emergence appears at around the age of 2;00, *to/for*-datives began to be produced later than DOCs, as reflected in the mean ages of onset in Table 5.

An overview of the English monolingual children's use of simple monotransitive structures and complex DA constructions is shown in Table 6. Taking into consideration the overall production of the constructions under analysis (100%), simple monotransitive constructions were more frequently used when compared to DA structures. When the overall incidence was examined in the latter, DOCs reflected relatively higher frequency rates when compared to *to/for*-datives.

Table 6. Overall production of simple and complex constructions by English monolinguals
(# of raw numbers (%))

Monotransitive	DOCs	*To/for*-datives	Total
13,517 (93.02%)	752 (5.17%)	262 (1.80%)	14,531 (100%)

The order in the production of simple monotransitive and complex DA constructions was also seen developmentally in the English monolingual children's data, that is, when the use of simple monotransitive structures was compared to that of DOCs ($t(13) = 4.100$, $p = .001$) and when it was compared to that of *to/for*-datives ($t(13) = 4.137$, $p = .001$). Statistically significant differences were also seen in the English monolingual children's relatively higher frequency rates in the production of DOCs when compared to *to/for*-datives ($t(13) = -4.224$, $p = .001$).

As for the incidence of simple monotransitive constructions through the fourteen age stages, the English monolingual children reflected a gradual increase in the production from the age range of onset at 0;06 (2 cases, 0.01%) to 3;00-3;06 (2,397 cases, 16.5%), as illustrated in Figure 1. A sharp decrease in the incidence of these constructions was observed at 3;07-3;11 (1,371 cases, 9.4%), stage from which English monolingual children revealed the highest incidence rates (2,688 cases, 18.5%). Finally, a gradual decrease was seen in the production of these constructions until 7;00-7;06 (181 cases, 1.2%).

	0;06-0;11	1;00-1;06	1;07-1;11	2;00-2;06	2;07-2;11	3;00-3;06	3;07-3;11	4;00-4;06	4;07-4;11	5;00-5;06	5;07-5;11	6;00-6;06	6;07-6;11	7;00-7;06
■ Mono-transitives (%)	0,0%	0,4%	2,1%	0,1%	10,1%	16,5%	9,4%	18,5%	10,3%	6,3%	2,6%	2,4%	2,9%	1,2%
Mono-transitives (cases)	2	59	302	1511	1471	2397	1371	2688	1494	912	373	341	415	181
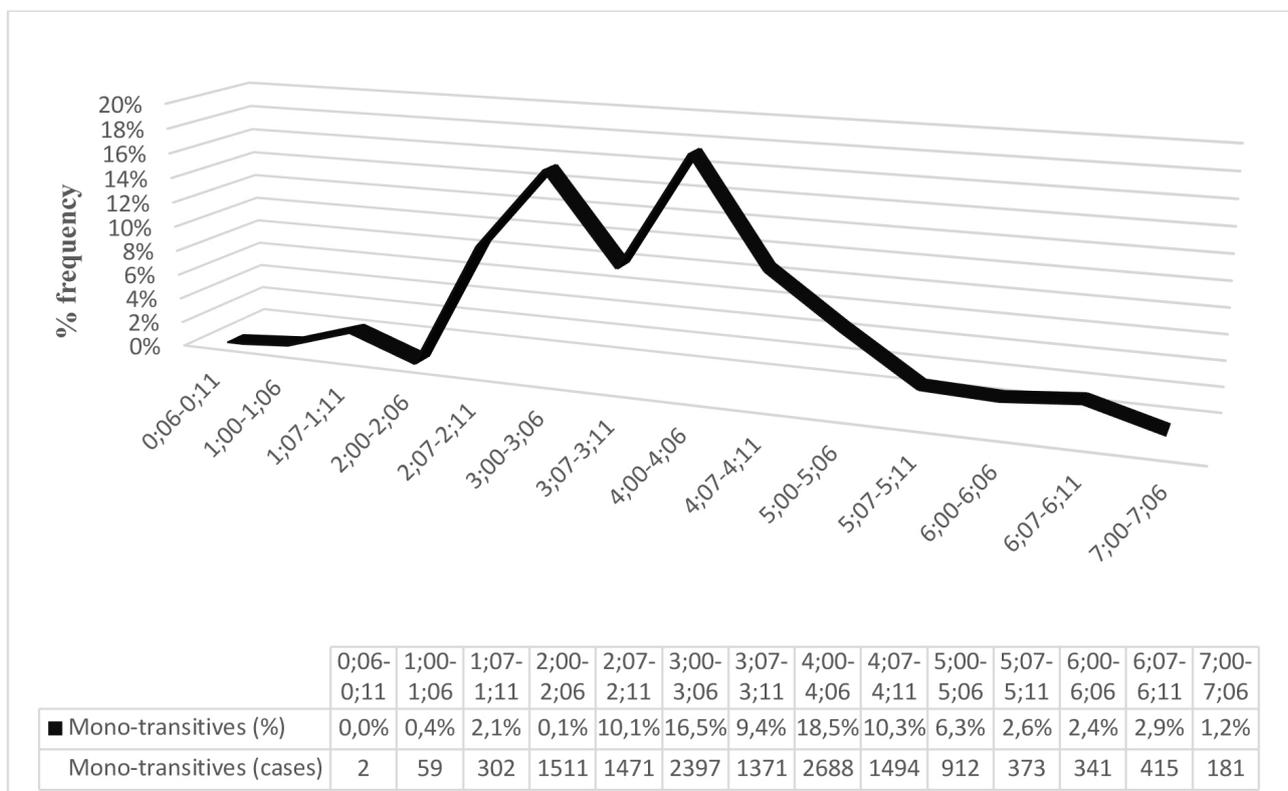
Figure 1. English monolinguals' use of simple structures through language development

As displayed in Figure 2, English monolingual children showed a gradual increase in the use of DOCs from the age group of onset at 1;00-1;06 (5 occurrences, 0.03%) to 3;00-3;06 (172 cases, 1.2%), stage from which the pro-

duction of these constructions gradually decreased until 7;00-7;06 (18 cases, 0.1%). The incidence of *to/for*-datives showed low frequency rates from the age range of onset at 1;07-1;11 (2 cases, 0.01%) to 7;007;06 (4 occurrences, 0.03%).


	0;06-0;11	1;00-1;06	1;07-1;11	2;00-2;06	2;07-2;11	3;00-3;06	3;07-3;11	4;00-4;06	4;07-4;11	5;00-5;06	5;07-5;11	6;00-6;06	6;07-6;11	7;00-7;06
to/for-datives (%)	0,0%	0,0%	0,0%	0,2%	0,3%	0,4%	0,1%	0,2%	0,1%	0,2%	0,1%	0,1%	0,1%	0,0%
to/for-datives (cases)	0	0	2	34	43	63	11	29	19	24	11	8	14	4
DOCs (%)	0,0%	0,0%	0,1%	0,3%	0,6%	1,2%	0,4%	0,7%	0,5%	0,4%	0,2%	0,4%	0,3%	0,1%
DOCs (cases)	0	5	9	39	93	172	62	101	71	51	28	58	45	18
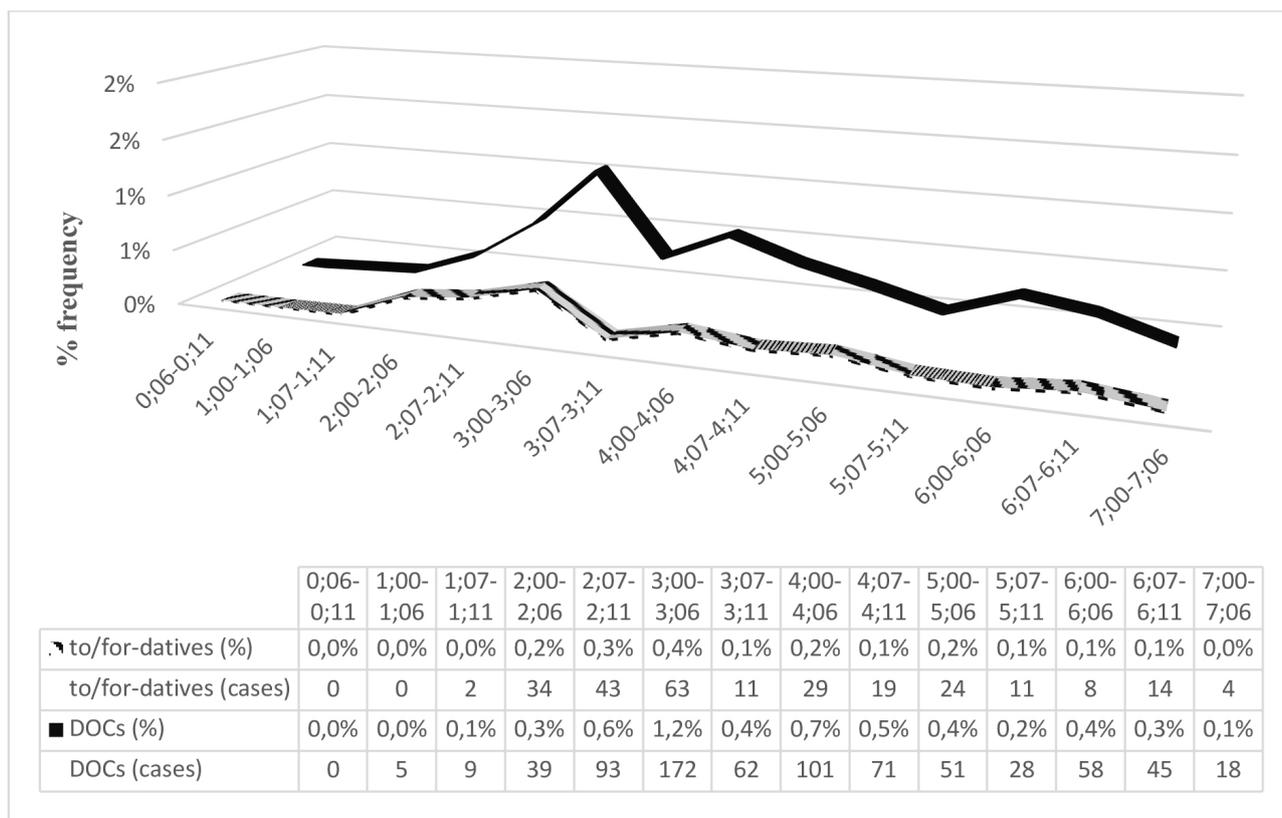
Figure 2. English monolinguals' use of complex structures through language development

Furthermore, and as displayed in Figure 3, the amount of exposure to which simple monotransitive and complex DA constructions were heard in the adults' speech seemed be in line with the English monolingual children's output.

	Mono-transitives	to/for-datives	DOCs
L1 EN children	93,0%	1,8%	5,2%
Adult input	87,7%	3,2%	9,1%
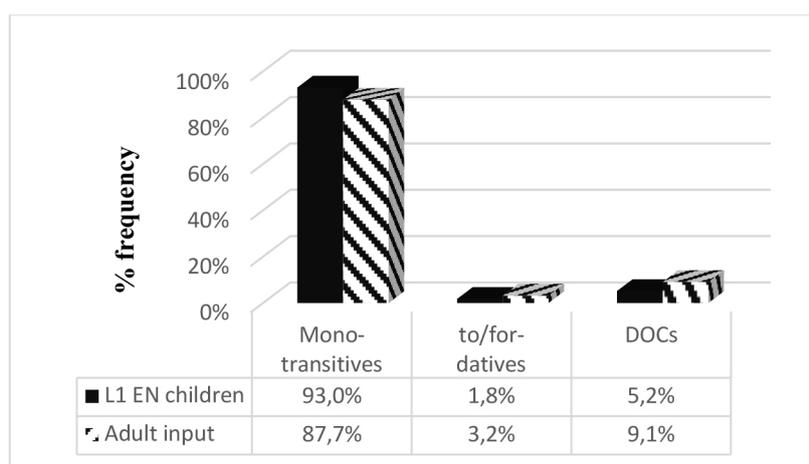
Figure 3. The production of simple and complex structures in the adult input and in the English monolinguals' output

More specifically, adults showed relatively higher frequency rates in the use of simple monotransitive constructions (17,838 cases, 87.7%) when compared to complex DOCs (1,853 cases, 9.1%) and complex *to/for*-datives (655 cases, 3.2%). An analogous pattern in the production of these constructions was observed in the English monolingual children's output (13,517 simple monotransitives > 752 DOCs > 262 *to/for*-datives, 93.0% > 5.2% > 1.8%).

7. Discussion of results

In response to RQ 1 and considering the data analyzed in section 6, the statistically significant differences between the English monolingual children's ages of onset of simple monotransitive structures and complex DA constructions suggest that the former emerge earlier than the latter given the syntactic complexity differences among the three structures under investigation (Abbot-Smith & Tomasello, 2006; Aranovich, 2012; Snyder, 2001). This is evidenced by the divergences in the number of arguments selected by the verb. While two arguments are selected by the verb in the case of simple monotransitive constructions, three arguments are subcategorized for by the verb in the case of DOCs that alternate as *to*-datives.

Although *for*-datives that alternate as DOCs present a monotransitive syntactic status in that the verbal head sub-categorizes for an external SU and an internal DO, they also exhibit DA properties between the internal DO and the non-selected A constituents. These complex predicate DA properties are akin to the ones observed in *to*-datives that alternate as DOCs (Sánchez Calderón, 2018; Sánchez Calderón & Fernández Fuertes, 2018). Thus, the grammatical properties underlying DOCs that alternate as *to*-datives and as *for*-datives seem to have delayed the English mono-lingual children's emergence of the two English DA complex predicate pairs.

The English monolingual children's early acquisition of monotransitive structures is in line with the fact that these constructions are less cognitively complex, and therefore, fewer Case Filter instantiations are required in the child output, when compared to the acquisition of the English DA (Chomsky, 1986).

Nevertheless, statistically significant differences are not seen in the English monolingual children's onset of the two complex DA constructions since DOCs and *to/for*-datives began to be produced at around the age of 2;00. This is evidenced by the analogous Case marking properties between DOCs that alternate as *to*-datives and those ones between DOCs that alternate as *for*-datives. Such a syntactic similarity is also argued by Snyder (2001) regarding the shared grammatical properties (or Property B) between the two DA constructions, as accounted for via the verbal combination with a secondary predicate (e.g., Larson, 1990) or the verbal selection of an SC that serves as the domain of the internal argument structure (e.g., Aoun & Li, 1989). Although statistically significant differences are not seen in the rather similar onset of the two complex DA structures, *to/for*-datives begin to be produced later than DOCs given the additional grammatical properties (or Property B) of the prepositions since they mediate the Case assigning properties to the DP by means of the verb (Larson, 1990).

Furthermore, the earlier onset of simple monotransitive constructions when compared to complex DA structures has sought confirmation in spontaneous data analyses (e.g., Campbell & Tomasello, 2001). However, Campbell and Tomasello (2001) do not examine the former and the findings reported are related to the monotransitive-like use of the two DA complex predicate structures (e.g., *give it*), as analyzed in English monolingual children's data.

Earlier works on the acquisition of the structures under analysis appear to speak against the findings observed in the present study since, as mainly analyzed in experimental works (e.g., Matthews *et al.*, 2005), English monolingual children were not reported to show an adult-like knowledge of simple monotransitive constructions until 3;00-4;00, which resulted in a later age range when compared to the emergence of complex DA constructions at around the age of 2;00 (Snyder & Stromswold, 1997).

In the light of RQ 2, the amount of exposure to simple monotransitive structures and complex DA constructions seemed to have had an effect on the English monolingual children's output. This was seen in the relatively higher frequency rates in the production of simple monotransitive constructions when compared to DOCs and *to/for*-datives, accordingly. These results are in line with the usage-based models of language acquisition (e.g., Abbot-Smith & Tomasello, 2006; Bybee & Hopper, 2001), as also reported by previous empirical studies on the acquisition of the monotransitive SVO pattern (e.g., Akhtar, 1999; Cameron-Faulkner *et al.*, 2003) and on that of the DA pattern (e.g., Campbell & Tomasello, 2001; Yang, 2016).

8. Conclusions

The present study has contributed to shed light on the acquisition of simple monotransitive constructions when compared to two complex DA constructions, namely, DOCs that alternate as *to/for*-datives, as analyzed in the English monolingual children's longitudinal spontaneous production available in CHILDES (MacWhinney, 2000). These findings have revea-led an order effect in the earlier emergence of simple monotransitive structures when compared to the two complex DA constructions. This is explained by the degree of syntactic complexity that each construction exhibits, as measured by the argumenthood properties. Therefore, those constructions that present more arguments in the verbal subcategorization framework (namely, three arguments in DOCs that alternate as *to*-datives as opposed to two arguments in monotransiti-ves) involve a higher syntactic complexity and, therefore, they are cognitively more complex, as reflected in the English monolingual children's mean ages of onset of these constructions. Similar cognitive complexity is seen in the delayed emergence of DOCs that alternate as *for*-datives when compared to monotransitive constructions. These data cannot be accounted for the argumenthood divergences since the three structures have a monotransitive syntactic status. Rather, the-se results seem to be explained by the DA properties and, thus, the higher number of Case Filter instantiations that DOCs that alternate as *for*-datives display in their argument structure that are not present in simpler monotransitive structures.

Nevertheless, the similar Case marking and alternating grammatical properties between the two DA structures as complex predicates (Property A; Snyder, 2001) have resulted in the rather similar emergence, as analyzed in English monolingual children's data. Despite these properties, *to/for*-datives seem to show an additional property (Property B; Snyder, 2001) given the special Case status of the prepositions.

Moreover, the order effect in the emergence of the constructions under investigation seems to be explained by the relatively frequency rates with which adults use simple monotransitive and complex DA structures. These data appear to lend support to usage-based models (e.g., Abbot-Smith & Tomasello, 2006; Tomasello, 2003) given the role played by adult input in child output.

Further analyses could explore whether biological gender differences are reflected in the English monolingual children's acquisition of simple monotransitive structures when compared to complex DA constructions, as attested by other studies on the acquisition of other constructions (e.g., Cornett, 2014). Likewise, further research is also required to shed light on whether other non-related age factors such as discourse factors (e.g., Snyder, 2003) go hand in hand with the order effect in the production of the three target constructions (i.e., monotransitive, DOCs and *to/for*-datives).

Acknowledgements

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