Two Roles for Development in Language Change: The Case of English *of* and *-s* Possessives

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1. Introduction

The last three decades have seen various appeals to integrate the study of language acquisition with language variation. Roberts (1997: 354) states: "a complete acquisitional model demands the inclusion of all forms of language, those which are variable as well as those which are categorical in nature." Nonetheless, the field's focus on accuracy biases the selection of phenomena towards categorical properties of grammar, rather than variable ones. Johnson and White (2020: 1) further remark: "[…] language is by its very nature variable, and [that] much of this variability is informative, as it is (probabilistically) governed by a variety of factors—including linguistic context, social or cultural context, the relationship between speaker and addressee, a language user's geographic origin, and a language user's gender identity. […] we anticipate a paradigm shift in the way many language researchers conceptualize the challenge of early acquisition."

Language variation has internal and external dimensions. Socially conditioned variation occurs where some variants are preferred with certain social contexts, registers, or interlocutors. Language-internal variation arises when certain characteristics of the sentence (non-categorically) influence variant selection. Both types of variation can be diachronically stable (i.e., faithfully replicated by the next generation), or associated with evolution in the language (i.e., changes in usage by the next generation result in different distributions for certain forms). Language change is not merely a reflection of imperfect acquisition; the role of acquisition in language change is far more complex (Cournane & Pérez-Leroux 2020). Individual child patterns may be transient (Yang 2016), and the interaction between variation and development continues over the lifespan. Patterns of variant selection may continue to change even in older adults (Sankoff 2018). The present study focuses on the intersection of language acquisition and language change. We consider two research questions. First, how do children select among variants undergoing change? Second, what is the role of children in advancing language change?

The present study explores children's use of the English possessive alternation between the preposition *of* and the Saxon genitive *-s*. We first discuss

how children handle variable phenomena, and review the conditions of the *of/-s* alternation and acquisition work in this area. We then present a study eliciting possessives in various contexts from children ages 4 to 12, examining at which points in development children align with the direction of linguistic change or match the adult distribution of these forms.

2. Learning variable phenomena

The literature on children's acquisition of variable grammatical phenomena suggests that variability in the exponent of a grammatical form is associated with delays in acquiring the grammatical form or contrast. For instance, studies of the acquisition of plural marking show that children's performance relates to the acoustic salience of the context of realization (e.g., Ettlinger & Zapf 2011). In general, varieties with reliable input are associated with faster learning of grammatical elements, and varieties where phonetic processes such as lenition increase the variability of the input are associated with slower acquisition timetables (e.g., Miller 2012; Miller & Schmitt 2010).

What variants do children select before they become target-like? When faced with multiple options, children tend to choose grammatical variants with simpler or less restricted distributions (German possessive *-s* vs. prep + datives; Pérez-Leroux, Roberge, Lowles & Schulz 2021). Frequency alone does not predict the chosen variant (Miller 2012). Two patterns have been observed in the literature. First, children tend to regularize unpredictable variation, often establishing early preferences for the less specified or null form, or the form with a more reliable distribution. Such results in studies of natural phenomena (Pérez-Leroux, Pirvulescu & Roberge 2018; Shin & Miller 2021) are reinforced by results from artificial language learning studies (Hudson Kam & Newport 2005, 2009). Child overregularizations extend across linguistic contexts and are not limited to the context where the form is variable in the adult grammar (Miller 2012). Second, spontaneous language studies focusing on socially-conditioned variation suggest that children pattern early with adult variation. For example, Smith and colleagues (2007, 2013) show that 2- to 3-year-olds learning the Buckie dialect of English closely match the rates of selection of a local diphthong variant by their caregiver, as well as their stylistic distribution. Other studies find that children under age five generally match their parents' patterns of grammatical conditioning for *t/d*-deletion and *–ing/in* variation, but not always their patterns of style-shifting (Labov 1989; Roberts 1997; Smith, Durham & Fortune 2009). In Nardy, Chevrot, and Barbu's (2014) study, kindergarteners show adaptation to the phonetic features associated with standard vs. regional French. The frequency of social interactions with other child speakers (but not adults) of the regional variety was linked to selection of the local variants. This early success with regional variability is also noted for gendered characteristics of speech, which have been reported to be acquired at 2.5 years old, before the onset of physiological changes associated with phonetic differences between genders (Fung, Schertz & Johnson 2021). While these observations are based on phonetic variability, similar patterns of convergence were found for other sociolinguistic lexical and syntactic variables

in 2- to 4-year-old children in Buckie, including agreement patterns and negation (Smith & Durham 2019). These studies reveal that speaker-related variation is not difficult for children to master. Again, these inferences are supported by the findings of artificial learning studies, such as those of Samara, Smith, Brown, and Wonnacott (2017), who find that six-year-old children can learn predictable variation based on speaker gender.

Focusing now on language change, there are two potential points where development plays a role in diachrony. The sociolinguistic literature portrays a picture of adolescents as promotors of language change, suggesting there is an adolescent "peak" in the use of innovative forms, often led by female speakers, across a range of phonological, morphosyntactic, and discourse-pragmatic changes (e.g., Denis, Gardner, Brook & Tagliamonte 2019; Holmes-Elliott 2016; Labov 2001, 2007; Tagliamonte & D'Arcy 2009). This distinctive adolescent incrementation pattern likely pertains to social-cognitive factors, rather than learning. Eckert (2011) points to social affiliation with peers in pre-adolescents' selection of linguistic variety. Regarding age effects in second language acquisition, Jia (1998) argues that post-adolescent differences in language learning depend in part on differences in speakers' willingness to change language affiliation and embed themselves in their new language communities.

Young children may be able to replicate the stable, speaker-driven patterns of variation they inherit from the speech communities, but they are not passive mirrors of the input. At a BUCLD meeting three decades ago, Brian MacWhinney is said to have argued that children overregularize past tense -ed because it is the most frequent form. To this, Steven Pinker replied that children today do not regularize –ed because it is more frequent form. Instead, it is the most frequent form today because children centuries ago chose to overregularize it. In work on the relationship between patterns of language change and acquisition, Cournane (2014, 2015, 2019) explicitly argues that children play a systematic role in cyclic grammaticalization processes. Specifically, she argues that systematic, cyclic changes in the syntax and lexical semantics of modal verbs arise from children's lexical learning biases. Similarly, Hall and Pérez-Leroux (2021) suggest that children's errors in the interpretation of comitative modifiers align with predicted directions of language change. These arguments are not restricted to grammar: Hall and Maddeaux (2020) find that young children extend unidirectional vowel change to new phonological contexts, fronting the /u/ vowel more than their parents after non-coronal consonants, which represents a later stage of this change in progress in North American English.

These emergent findings at the intersection of language acquisition and sociolinguistics open a promising line of inquiry into how children participate in language change. In this study, we aim to explore how children learn the possessive alternation between -s and of, a well-studied phenomenon in adult spoken and written English that is currently undergoing a change in progress in many dialects. In the following section, we explain this diachronic change, the factors that constrain the alternation, and the evidence to date on child acquisition of these forms.

3. The possessive *-s/of* alternation
3.1. Diachrony

In English, the expression of possessive modification involves a choice between two constructions: the *-s* possessive and the *of* possessive. The Germanic *-s* inflection is the older form, while Latinate *of* entered the system in the Middle English period (Jankowski & Tagliamonte 2014). Between the thirteenth and fourteenth centuries, *of* quickly overtook *-s* in frequency in written materials (Rosenbach 2002). Over this period, the two forms became differentiated by animacy: humans and other animate possessors were primarily associated with *-s*, and inanimate possessors with the *of* construction (Altenberg 1982; Rosenbach 2002). By the sixteenth century, the *-s* possessive began to rise in frequency again in written data, and this trend has continued in both American and British English through to recent years (e.g., Hinrichs & Szmrecsanyi 2007; Leech, Hundt, Mair & Smith 2009; Rosenbach 2002, 2005; Szmrecsanyi & Hinrichs 2008). Unlike other diachronic changes that proceed in a cyclic manner, such as the modal cycle, this pattern represents a directional change which can shift over time as speakers restrict or widen the domain of selection of one variant over the other. Fewer studies have been conducted on the possessive alternation in spoken language, but Jankowski and Tagliamonte (2014) find evidence of a similar change in progress in vernacular speech in Ontario, Canada: younger speakers (ages 17-29) in their study produced more *-s* possessives than older speakers, particularly with certain possessor types. In the next section, we turn to these and other factors that condition the choice of possessive construction.

3.2. Factors

The main current factor influencing the choice of possessive variant is possessor animacy: animate possessors tend to favor *-s* use (*the boy's bike*), while inanimates favor *of* (*the roof of the building*) (e.g., Biber, Johansson, Leech, Conrad & Finegan 1999; Ljung 1997; Rosenbach 2005, 2014). Use of *s*-genitives decreases in frequency depending on the lexical type of the possessor; these frequencies roughly follow an animacy scale such as that in (1), adapted from Rosenbach (2007: 154):

(1) human   >   animal   >   collective   >
     the boy's bike   *the dog's collar*   *the company's leader*

     temporal   >   locative   >   common
     Monday's mail   *Toronto's suburb*   *the building's roof*

The increase in *-s* in written texts over the twentieth century has been described as a semantic change, as the *-s* variant started to extend down the animacy hierarchy to other types of non-human possessors. The *-s* possessive has become increasingly frequent with certain subtypes of animate and inanimate possessors, particularly collectives, temporal nouns, and geographic locations

(Hinrichs & Szmrecsanyi 2007; Rosenbach 2002, 2005; Wolk, Bresnan, Rosenbach & Szmrecsanyi 2013).

Studies of spoken language also find a close relationship between possessor animacy and choice of possessive variant. Jankowski and Tagliamonte (2014) find that human possessors are strongly associated with *-s* in Ontario English; similarly, Xi, Grohe, Schulz, and Yang (2021) identify an animate/inanimate split between *-s* and *of* in child-directed speech. Jankowski and Tagliamonte (2014) also consider the distinction between prototypical and non-prototypical relationships. Prototypical possession presumably reflects a close association between the possessor and possessum, including body parts, kinship terms, permanent ownership, and part/whole relationships for inanimate objects. Other relations are considered non-prototypical. In Ontario, Jankowski and Tagliamonte (2014) found that animacy and type of possession account for most of the distribution of the two variants: prototypical human possessors are 96 percent *s*-genitive, and prototypical non-humans are 95 percent *of*-possessive. With possessors lower on the animacy scale, such as collectives/ organizations and places, the *-s* variant is increasing in frequency among young speakers, indicating that the change seen in written data is now taking place in spoken English as well. In these more variable contexts, a few other factors were found to influence possessive use: possessors with final sibilants disfavor the *s*-genitive (*petals of the rose* vs. *rose's petals*), whereas *-s* is favored with one-word possessors compared to two-word possessors (e.g., *people's feelings* vs. *feelings of certain people*), as well as in contexts with a previous *-s* token in the discourse (Jankowski & Tagliamonte 2014).

Jankowski and Tagliamonte (2014) attribute the extension of the *s*-genitive to collectives and place-possessors to metaphorical extension (Rosenbach 2002: 248-250). As the youngest speakers in their study were 17 years old, it is difficult to assess the precise timeline of their participation in the change. To consider this, we now turn to studies on the acquisition of possession.

3.3. Acquisition

Studies of early child language development suggest that young children initially omit both *-s* and *of* from possessive constructions (Bloom 1970; Bowerman 1973; Brown & Bellugi 1964; de Villiers & de Villiers 1973; Radford 1990; Tomasello 1998; see Marinis 2016 for a review). Brown (1973) found that for children who are just beginning to combine words, alienable N + N possessives, particularly the property and part/whole types of relationships, are more commonly produced than inalienable possessives. Inalienable possessives increase in frequency after Stage I, and use of the *-s* inflection becomes productive in Stage III (approx. 26-40 months of age). By age 4, typically developing children use possessive *-s* with over 90% accuracy (Paul & Alforde 1993). Studies on prepositional *of* are comparatively scarce; Tomasello (1987) observed that this form emerged around age 1;9 in his daughter, but the other early studies do not consider *of* separately from *-s*. Marinis (2016) proposes that both types of

possessives show the same pattern of development: initial omission, followed by variable use, and finally adult-like use of the forms.

In his review of possessive systems across languages, Marinis (2016: 439) indicates that *-s* is preferred with animate, topical, short possessors and prototypical relations (e.g., *John's hair*), while *of* is favored with inanimate, non-topical, and longer possessors (e.g., *the sound of the car's exhaust*). However, these distributional differences are not considered from a developmental perspective in any of the studies reviewed. One study includes some of these factors in examining English possessive acquisition: Koch (2010) conducted both corpus-based and experimental studies focusing on *-s* and *of* productions by young children. In the corpus study, she found that British children ages 3, 5, and 7 used *-s* possessives more often than *of* overall, and that 3-year-olds used far fewer possessives overall than the older children did, suggesting that productive use of both constructions emerges between ages 3 and 5. Koch (2010) then conducted an elicitation task with 5- and 6-year-old American children in order to examine the possessive distribution in more detail. The materials controlled for possession relationship (alienable/inalienable) and possessor animacy (animate/inanimate). The results revealed that children were sensitive only to animacy: they used the *s*-genitive with inanimate possessors (as well as animates), but never showed the reverse pattern of using *of* with animates. Koch (2010) considered these results to support Rosenbach's (2002) finding that *-s* is undergoing change, extending to inanimate possessors; in her view, young children are actively taking part in this change. Departing from this initial study, we explore the development of *-s* and *of* from the preschool years to pre-adolescence.

4. Study
4.1. Questions and hypotheses

The present study examines the use of *-s* and *of* possessives in children ages 4 through 12. Specifically, we ask whether young children initially replicate the possessive system seen in adults, reflecting faithful transmission, or change some aspects of the system as they learn it, such as the frequency of one form or the constraints governing the use of *-s* and *of*. The latter scenario would be predicted by the imperfect acquisition hypothesis, and in this case, the child patterns could either align with or diverge from the direction of change towards the *-s* possessive. Among older children, we look for a potential increase in the frequency of the *-s* variant, based on the incrementation hypothesis that children advance the change in progress as they progress towards adolescence.

4.2. Methods
4.2.1. Participants

We recruited 72 children and 15 adults from southern Ontario, focusing on the Greater Toronto Area (GTA) and surrounding communities. All participants came from English-speaking households and reported only limited (if any)

exposure to other languages; all child participants were further reported to be typically developing. The child participants were recruited within three age groups: a younger group of 4- to 6-year-olds, a middle group of 7- to 9-year-olds, and an older group of pre-adolescents from 10 to 12 years old. The adult participants ranged from 18 to over 50 years of age. Table 1 summarizes the participant groups in terms of age and gender.

Table 1: Study participants by age group and gender

	Younger	Middle	Older	Adults
# of part-icipants	22 (12M, 10F)	16 (6M, 10F)	19 (10M, 9F)	15 (6M, 9F)
Age range	4;0 to 6;11	7;0 to 9;11	10;0 to 12;11	18+
Mean age (SD)	5;10 (8.8 mos)	8;7 (10.8 mos)	11;3 (9.9 mos)	

4.2.2. Task

The main task in this study involved an elicited production paradigm with 60 total items, administered to participants in two sets of 30 items each. The possessive experiment consisted of 26 items in total; the remaining items were fillers and trials designed to elicit another variable, future temporal reference. In each possessive trial, one or two pictures were presented to the participant on a laptop while the experimenter read a short story, followed by a question designed to elicit a possessive construction. Figure 1 shows two sample test items.

This is a witch, and this is a wizard. They both have tall hats, long hair, and pointy shoes. What is purple? **"The witch's hair"**	This is Candyland, and this is Disneyland. They both have a prince and a princess. Who is holding a lollipop? **"The princess of Candyland"**

Figure 1: Sample possessive test items

The task controlled for possessor animacy, also called lexical type: we targeted the five main categories of humans (e.g., *witch's hair*), animals (*pig's sister*), collectives/organizations (*team's ball*), places (*Candyland's princess*), and inanimates (*roof of the school*). Other factors of possession relationship are

not reported here, including prototypicality, possessor length, and the presence or absence of a final sibilant in the possessor, which were nested within animacy.

4.3. Results

Participants' responses were audio-recorded, transcribed, and coded for type of response. Participants provided a range of response types in addition to the two main possessive constructions. Responses containing -*s* or *of* were considered target, while non-target (but still correct) responses such as compounds (e.g., *the Candyland princess*), other prepositions (*the princess in Candyland*), and relative clauses (*the princess that's from Candyland*) were classified as "other." Responses that did not fully identify the correct item in the picture were deemed "incomplete" (e.g., *the princess*). Figure 2 shows the proportion of each type of response by age group. Here it is apparent that the youngest children provided the most incomplete responses, but these diminish to a very small proportion of total responses by ages 7 to 9, as target responses increase. "Other" responses seem to be equally common across all age groups.
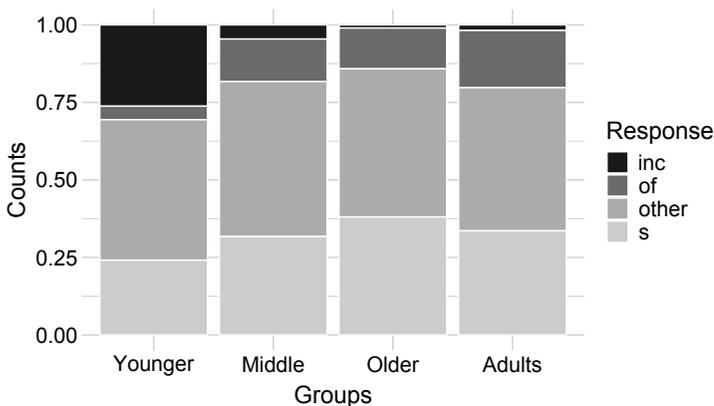

Figure 2: Response types by age group

Our analysis compares the frequency of use of the two target responses -*s* and *of* only, as a function of lexical type. Figure 3 plots these results by age group, with each animacy category presented separately. From Figure 3, we see that all participants use very high rates of -*s* with human possessors; these results appear to be at ceiling, reflecting near-categorical use of -*s* with this lexical type. Animals and collectives have the next highest rates of -*s* responses overall, followed by places and inanimates. In terms of age, the variable categories of animals, collectives, places, and inanimates all show U-shaped curves: the youngest children use the -*s* form the most often, followed by a drop in -*s* use among the middle group, and then an increase in 10- to 12-year-olds. Adults show the lowest rates of -*s* possessives with the lexical types that are lower on the animacy scale, including collectives, inanimates, and places.

Figure 3: Proportion of -*s* use by lexical type and age group

Figure 4 further illustrates the age-related findings for the three groups of children, showing the overall proportion of -*s* use as a function of age in months. This plot also has a U shape, indicating more frequent production of the -*s* variant by younger and older children, and less frequent use of -*s* by children in the middle group, regardless of the lexical type of the possessor.

Figure 4: Overall proportion of -*s* use in children by age in months

To test the effects of both internal and external constraints on possessive use, we ran a generalized linear mixed effects (logit) model fit by maximum likelihood (Laplace), with -*s* as the dependent variable (and using only the data for -*s* and *of*). The model with the best fit included the fixed effects of age group (with adults

as the reference level, and places combined with inanimates into one category), lexical type (animals as reference level; humans were excluded from this model, since they were near-categorically associated with -*s*), and speaker gender (female speakers as reference level), plus a random effect of participant. Interactions between variables were also tested but were not significant, nor did they improve the fit of the model. Table 2 shows the results of this analysis.

The results in Table 2 align with the U-shaped patterns observed in Figures 3 and 4, indicating an overall peak for *s*-genitive preference in younger ages, a retrenchment to the adult baseline at ages 7 to 9, and a second, marginally significant increase as children approach adolescence. Collective and inanimate possessors significantly disfavor -*s*. Lastly, the results for speaker gender were marginally significant, with female speakers favoring -*s*.

Table 2: Results of mixed effects model for -*s* production (vs. *of*)

Level	Estimate	*p*
Age: Younger	1.315	0.02 *
Age: Middle	0.161	0.77
Age: Older	0.924	0.08 ·
Type: Collective	-1.102	<0.001 **
Type: Inanimate	-3.336	<0.001 **
Speaker Gender: M	-0.680	0.09 ·

5. Discussion

The distribution of possessive *of* and –*s* is constrained by lexical semantic factors. Children's patterns of selection of possession are similar to adults', in that they use genitive -*s* at near-ceiling rates with human possessors. While still the dominant response for animal possessors, the use of -*s* is less consistent, and it drops to roughly 75% for collective entities. For inanimates and places, the genitive is dispreferred, used in only a quarter of the instances. Despite this overall similarity across age groups, the younger children in our study (ages 4-6) used more -*s* than adults across all conditions. Children in the middle group (ages 7 to 9) patterned with adults, whereas pre-adolescents again showed a bias towards -*s*, although less pronounced than that of the younger group. The results for gender, while not the focus of our hypotheses, align with general sociolinguistic findings that female speakers tend to lead language change.

We interpret this age-related evidence as offering support for two distinct roles of development in language change. The main driver of this directional, non-cyclic change in progress appears to be genitive overgeneralization by young children. Our data also hints at the presence of a pre-adolescent incrementation process, at the age where children begin to shift dialect affiliations. Both processes in combination support Cournane's (2019) U-shaped model for the role of development in incrementation of language change, as shown in Figure 5.
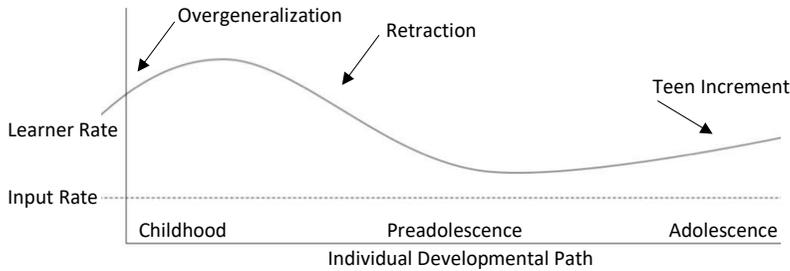
Figure 5: Reverse U-model of incrementation (Cournane 2019: 143)

To conclude, our study identifies two points in development that impact language change: early childhood overgeneralization and pre-adolescent incrementation. These are associated with two distinct developmental processes. First, children learn the basic ingredients of grammar early, and proceed to refine the mappings of the various forms. During the early preschool years, young children may align the distribution of a form with the adult patterns, or settle it in a slightly different way, with broader or narrower extensions. In strong continuity models (Pinker 1984; Snyder 2006; Yang 2002), all grammatical learning is based on grammar selection. In contrast, both minimalist models of language and emergentist models describe early grammar learning as lexical and incremental. Second, adolescents show developmental changes in selection of sociolectal variants, including what sociolinguists have labelled an adolescent peak in incrementation, often led by female speakers. Adolescents are also described as developing their language identity. Any complex language community contains multiple similar but not identical competing grammars (Kroch 1989). As longitudinal sociolinguistic data has recently become available, it has been noted that changing preferences for given grammatical variants continues to develop through the lifespan (Sankoff 2018); adolescents are likely just more active in this process than adult speakers. We propose that grammar learning processes and dialect selection processes represent distinct mechanisms, one related to the initial formation of grammatical categories, and the other reflecting developmental changes in social affiliation.

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