

The Role of Salience in Linguistic Development: A Contrarian View

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INTRODUCTION

Two fundamental questions lie at the heart of linguistic inquiry: why do languages have the particular properties that they do, and how are those properties acquired in the course of first and second language learning? Ideally, an explanatory theory of language should provide a unified answer to both questions. Indeed, that is precisely the goal of traditional work on Universal Grammar, which proposes a theory that accounts both for the properties of language and for how those properties emerge so consistently in the course of development. Recent emergentist work has a similar goal, which it pursues by seeking to explain linguistic properties and their acquisition in terms of more fundamental forces and factors (e.g., O’Grady, 2005, 2015a,b).

The viability of emergentist approaches to language depends on their ability to identify the particular mechanisms that shape development. One idea, dubbed ‘processing determinism’ by O’Grady (2015b), focuses on the role of processing cost, as determined by two complementary factors. On the one hand, there are internal pressures that stem from the burden that particular operations place on working memory, leading languages (and learners) to favor certain types of morphosyntactic options over others. On the other hand, there are external factors such as frequency of occurrence, which creates opportunities for routines to be strengthened and entrenched through repeated activation (e.g., Paradis, 2004, p. 28).

The question that we wish to address here has to do with whether the factors that help shape development might include some form of salience, as frequently suggested in the acquisition literature. In early work, salience was treated largely as an acoustic/perceptual phenomenon. Brown (1973, p. 409) suggested that the concept be broken down into variables such as phonetic substance, stress level, and serial position in the sentence. A very similar approach was adopted by Goldschneider & DeKeyser (2001) as part of their meta-analysis of developmental order in second language acquisition, and views along these lines have been expressed by many others as well, including O’Grady et al. (2011).

More recently, the notion of salience has been expanded in work on language acquisition to encompass features and items that ‘stand out from the rest’ in various senses (Carroll, 2006; Carroll & Shea, 2007; Ellis, 2016, p. 342). For example, Goldschneider & DeKeyser (2001, p. 35) suggest that low semantic complexity, morpho-phonological regularity, and membership in an open syntactic category such as noun or verb all count as instances of salience. Other proposed additions include certain associations between linguistic elements, the frequency or infrequency of particular patterns in the input, and surprisal effects that arise in response to failed expectations about what is to come next in the course of processing (e.g., Ellis, 2016).

We question the value of salience as an explanatory notion for two reasons. First, we believe that the developmental facts that traditionally are explained with reference to acoustic prominence (the prototypical example of a salience effect) are better explained in other ways, as we will show. Second, we believe that the expansion of the notion of salience to encompass a broad range of non-acoustic effects, sometimes without convincing independent evidence, is in fact unnecessary, given the availability of alternative processing-based explanations.

We will explore these matters by examining three developmental phenomena for which salience-based explanations have been proposed: early success in the interpretation of reflexive pronouns, the role of ‘hierarchy effects’ in shaping the emergence of relative clauses, and difficulties in the mastery of inflectional morphology, ranging from the verbal suffix *-s* in English to case marking in Korean. We propose an alternative account for each of these phenomena that features processing cost as the key explanatory concept. We conclude by urging a reassessment of apparent salience effects, with a view to their integration into a larger processing-based account of language and learning.

REFLEXIVE PRONOUNS

It has long been understood that prototypical reflexive pronouns in English and many other languages seek out a ‘co-argument antecedent’ (Jespersen, 1933, p. 111). Thus, the reflexive pronoun in (1), the direct object of *cut*, can only refer to Richard, the subject of the same verb. It cannot refer to David, let alone to some unnamed party.

- (1) David just found out what happened. [**Richard** cut **himself** while playing with scissors.]

Interestingly, this fact seems to be mastered very quickly in the course of both first and second language acquisition; see O’Grady (2015a) for discussion of various details.

O’Grady (2015a) proposes that the procedure responsible for the interpretation of reflexive pronouns is the product of internal processing pressure. The key idea is that the burden on working memory is minimized if the reflexive pronoun is interpreted immediately and locally, without the need to access less available options, such as an NP in another clause or even in another sentence. (In the example below, PRED = predicate; *r* = Richard.)

- (2) How sentence-level processing might map the sentence *Richard cut himself* onto a semantic representation in real time:
- a. The nominal *Richard* is encountered and is assigned a referent (represented here as the index *r*).

Richard
r

- b. The transitive verb *cut* is encountered and its two-place predicate-argument structure is projected, with Richard as the first argument.

Richard cut
 CUT
 <*r* _>

- c. The reflexive pronoun is encountered and identified as the verb's second argument (represented by the symbol *x*), thereby triggering the search for an antecedent.

Richard cut himself.
 CUT
 <*r x*>

- d. The processor interprets the reflexive pronoun immediately and locally with the help of the previously identified referent of the verb's first argument, Richard.

Richard cut himself.
 CUT
 <*r x*>
 ↘_{*r*}

This proposal contrasts with the idea, quite commonly proposed (e.g., Mitkov, 2002, p. 50ff; Huang, 2005), that reflexive pronouns take as their antecedent the most salient NP in the sentence. But what makes an NP salient enough to serve as the antecedent of a reflexive pronoun? It can't be because it is sentence-initial—*Richard* is the sentence-initial NP in (3), but it can't be the antecedent for the reflexive pronoun.

- (3) ***Richard's** sister cut himself while playing with scissors.

Salience also cannot be equated with an NP's proximity to the reflexive pronoun—Richard is the closest NP in (4), but it can't serve as antecedent for *himself*.

- (4) *Some friends of **Richard** cut himself while playing with scissors.

Salience also can't be defined in terms of a grammatical relation such as 'subject'. There are two subjects in the next sentence, but only the second one can be the antecedent for the reflexive pronoun, even though the first one could well be foremost in the speaker's mind as well as discursively and acoustically prominent.

- (5) Well, **JERRY** thinks that Richard cut himself while playing with scissors.

Moreover, there are patterns such as (6) in which the antecedent for the reflexive pronoun is not even a subject.

- (6) I described **Richard** to himself (so that he'd know how funny the costume looked).

Crucially, though, all of these examples fit easily into the processing-based analysis, since in each case the reflexive pronoun is associated with a co-argument, consistent with the idea that the search for an antecedent must minimize processing cost.

The interpretation of plain pronouns (*him, her, etc.*) works very differently. As the following example shows, plain pronouns do not permit a co-argument antecedent: unlike *himself*, *him* cannot refer to Richard; instead, it must refer to an individual named elsewhere in the sentence (e.g., David) or even to someone not mentioned in the sentence.

- (7) Plain pronoun (distant antecedent):
[S David said [S Richard cut *him* while playing with scissors]].



For this reason, there is no single processing routine that can pick out an antecedent for a plain pronoun. Instead, listeners have to rely on pragmatic factors, including clues from the context and the extra-linguistic situation, to identify the pronoun's referent. This in turn has developmental consequences, as we would expect is considerations of processing cost shape the courses of acquisition.

Experimental work by Clackson, Felser & Clahsen (2011) is suggestive in this regard, as can be seen by considering the following illustrative example from an eye-tracking study that they conducted.

- (8) *Peter* was waiting outside the corner shop. He watched as *Mr. Jones* bought a huge box of popcorn for *him/himself* over the counter.

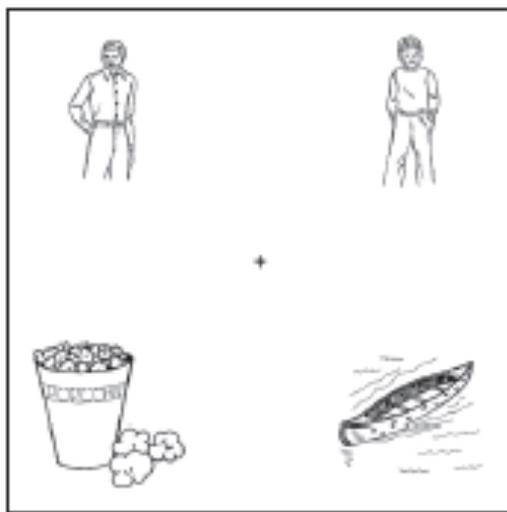


Figure 1 Sample picture used for eye-tracking task

Here, *Peter* is discursively prominent (i.e., salient, based on its position and topicality), but *Mr. Jones* is more local and should therefore be the preferred antecedent on processing grounds. Based on eye-tracking data, Clackson et al. found that children aged 6 to 9 treat *both* Peter and Mr. Jones as potential referents regardless of the type of pronoun. Crucially, though, they always end up making the right choice for reflexive pronouns, selecting Mr. Jones as the antecedent and thereby minimizing processing cost.

Interestingly, they do not fare so well with plain pronouns, which they sometimes wrongly associate with the nearer antecedent (*Mr. Jones* rather than *Peter*), essentially treating them as if they were reflexive pronouns; see Conroy, Takahashi et al. (2009) for extensive discussion of this phenomenon. We interpret this as further evidence in support of processing determinism: the single low-cost processing routine associated with reflexive pronouns is preferred to the open-ended pragmatic reasoning that is required to interpret plain pronouns, even when the antecedent is discursively prominent.

RELATIVE CLAUSES

Studies of the acquisition of relative clauses have yielded many important findings in the literature on sentence processing and language learning. One such finding, well documented for both first and second language learners, involves a strong preference for subject relative clauses over other relative clause types in both comprehension and production (O’Grady, 2011, and the references cited there), consistent with the ‘accessibility hierarchy’ first proposed by Keenan & Comrie (1977) and subsequently amended by Hawkins (2004, p. 117), as follows.

(9) Subject > Direct Object > Indirect Object/Oblique

Because the subject advantage appears to hold cross-linguistically, attempts to explain it must accommodate very different types of languages. Kim & O’Grady (2015) explored alternative explanations for hierarchy effects by considering the production of relative clauses by 5- and 6-year-old monolingual children learning English and Korean as a first language. The contrast between the two languages is particularly sharp and therefore highly relevant to the challenge of offering a unified explanation for the subject advantage: English is an SVO language, with no case marking and post-nominal relative clauses; in contrast, Korean is an SOV language, with case marking and pre-nominal relative clauses.

(10)a. Typical English relative clause (post-nominal, SVO order, no case marking)

the boy [that _ lost the bag]

b. Typical Korean relative clause (pre-nominal, SOV order, case marking)

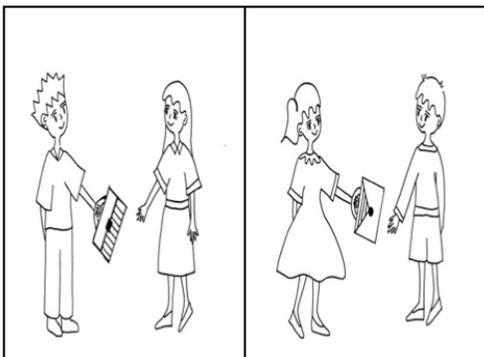
[_kapang-ul ilh-un] sonyen

bag-Acc lose-Pst.RC boy

‘the boy that lost the bag’

In Kim & O’Grady’s experiment, the job of the child was simply to describe the person over whom an arrow appeared in pictures such as those in figures 2 - 5 below. An accompanying prompt provided a context that encouraged the use of a relative clause. The experiments focused on two contrasts, the first of which was between subject relative clauses and indirect object relative clauses, so chosen because each involves a head that is prototypically animate. Figures 2 and 3 illustrated the materials used to elicit relative clauses of these types.

Step 1: Prompt: “In the first picture, a boy is giving a bag to a girl. In the second picture, a girl is giving a bag to a boy.”



Step 2: An arrow appears over the boy in the picture on the left. Targeted response: “the boy [that _ is giving a bag to the girl].”

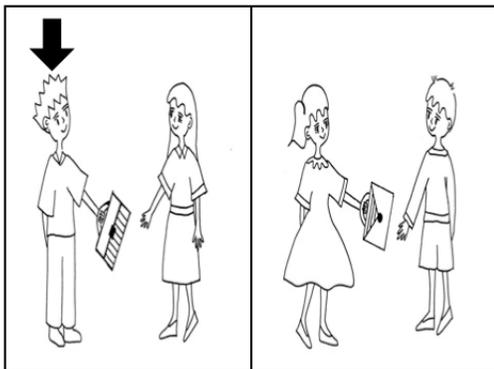
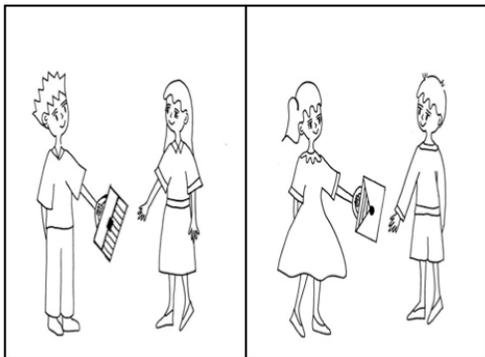


Figure 2. Sample protocol used to elicit a subject RC.

Step 1: Prompt: “In the first picture, a boy is giving a bag to a girl. In the second picture, a girl is giving a bag to a boy”.



Step 2: An arrow appears over the boy in the picture on the right. Targeted response: “the boy [that the girl is giving a bag to _].”

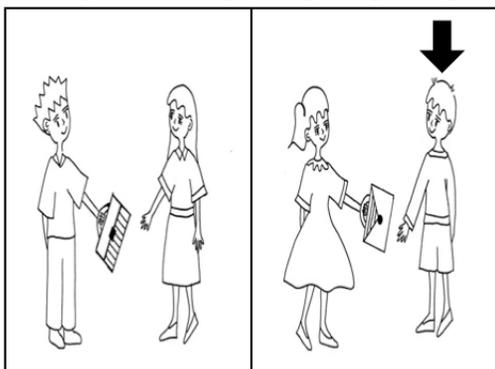


Figure 3. Sample protocol used to elicit an indirect object RC.

The second contrast involved direct object and oblique relative clauses, each of which typically modify an inanimate head. Figures 4 and 5 illustrate the materials used to elicit these two patterns.

Step 1: Prompt: “In the first picture, a boy is putting a book on a box. In the second picture, a girl is putting a book on a box.”



Step 2: An arrow indicates the book in the picture on the left. Targeted response: “the book [that the boy is putting _ on a box].”

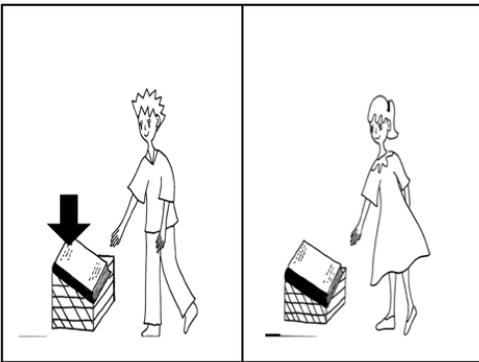
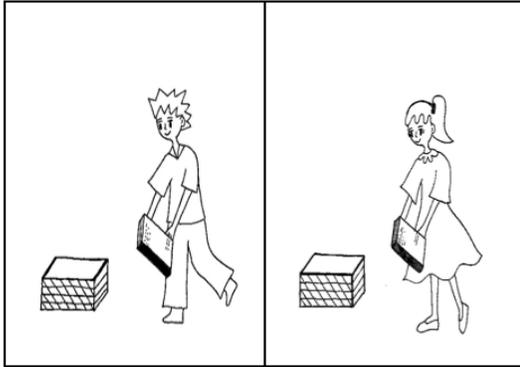


Figure 4. Sample protocol used to elicit a direct object RC.

Step 1: Prompt: “In the first picture, a boy is putting a book on a box. In the second picture, a girl is putting a book on a box.” Targeted response: “the box [that the boy is putting a book on _].”



Step 2: An arrow indicates the box in the picture on the left. Targeted response: “the box [that the boy is putting the book on _]”



Figure 5. Sample protocol used to elicit an oblique RC.

Table 1 reports the production rates for the four types of relative clauses under consideration here.

Table 1. Success rates for each relative clause type

RC type	Learners of English	Learners of Korean
Subject	94.3%	80.8%
Indirect object	2.9%	8%
Direct Object	47.6%	74.4%
Oblique	26.7%	14.4%

Consistent with the amended version of the Keenan-Comrie hierarchy, both groups of learners were significantly more successful at producing subject relative clauses than the other three types of relative clauses; moreover, also as predicted, the success rate for

direct object relative clauses was significantly higher than those for indirect object and oblique relative clause patterns. (Similar results were found in a parallel study of Korean-speaking adult learners of English as a second language.) But why?

One possibility, put forward by Diessel & Tomasello (2005), is that subject relative clauses have the advantage of manifesting the same salient SVO word order widely found elsewhere in English. (On the salience of the dominant word order, see Comrie, 1997.)

- (11)a. Subject relative clause:
 the boy [that _ lost the bag]
 SUBJ VERB DIR OBJ
- b. Direct object relative clause:
 the bag [that the boy lost _]
 DIR OBJ SUBJ VERB

Crucially, however, this idea fails to generalize to Korean, in which there is also a preference for subject relative clauses in Kim & O’Grady’s child participants, in the adult native speakers who they also studied (see also Kwon, Gordon et al., 2010), in adult second language learners (O’Grady, Lee & Choo, 2003), and in adult heritage learners (O’Grady, Kwak et al., 2011). Yet, as the following examples help illustrate, *neither* subject relative clauses nor direct object relative clauses manifest the canonical SOV order of Korean.

- (12)a. subject RC
 [_ kapang-ul ilh-un] sonyen
 bag-Acc lose-Pst.RC boy
 DIR OBJ VERB SUBJ
 ‘the boy that lost the bag’
- b. direct object RC
 [sonyen-i _ ilh-un] kapang
 boy-Nom lose-Pst.RC bag
 SUBJ VERB DIR OBJ
 ‘the bag that the boy lost’

Still another idea relies on a different notion of salience: there is a preference for relativizing NPs that occur in more prominent earlier positions of a sentence (e.g., Ferreira & Dell, 2000; Montag & MacDonald, 2009, p. 2594). A salience account based on linear prominence is compatible with the asymmetries in English, since the subject precedes the direct object, which in turn precedes indirect objects and obliques.

- (13)a. Subject – direct object – indirect object:
 Mary gave a bag to the boy.
 SUBJ DIR OBJ IND OBJ

- b. Subject – direct object –oblique:
 Mary placed the book on the floor.
 SUBJ DIR OBJ OBL

However, it fails for Korean, in which indirect objects and obliques typically *precede* the direct object.

- (14)a. Subject – indirect object – direct object:
 Mary-ka sonyen-eykey kapang-ul cwu-ess-eyo.
 Mary-Nom boy-to bag-Acc give-Pst-Sent.Ender
 SUBJ IND OBJ DIR OBJ
 ‘Mary gave a bag to the boy.’

- b. Subject – oblique – direct object:
 Mary-ka patak-ey chayk-ul neh-ess-eyo
 Mary-Nom floor-on book-Acc put-Pst-Sent.Ender
 SUBJ OBL DIR OBJ
 ‘Mary placed the book on the floor.’

Kim & O’Grady propose a processing explanation for hierarchy effects that posits the interaction of two general propensities:

- Relative clauses must be about the referent of the noun they modify (Kuno, 1976; MacWhinney, 2005).
- Topicality (‘aboutness’) is strongly associated with the subject, less strongly with the direct object, and barely at all with obliques (Aissen, 1999; Lambrecht, 1994, p.136; Givón, 1984, pp. 138, 170-71)

From a processing perspective then, subject relative clauses are preferred as the default pattern, since the two general requirements align perfectly—the relative clause is about the referent of the subject, which in turn is the default topic to begin with. In contrast, direct object, indirect object and oblique relative clauses require that the relative clause be construed in a less canonical way, presumably at additional processing cost, so that it is about something other than the referent of its subject.¹

Of course, one could propose that topicality creates salience (e.g., Chiriacescu, 2011), but this idea would have to somehow be reconciled with the contrary claim that focal (i.e., non-topical) information—typically expressed by *non*-subjects—is salient (e.g., Gee, 1999, p. 121ff). Alternatively, one could assume that both topics and non-topics are salient, or that they are salient in different ways, but this would just mean that virtually everything is salient, robbing the notion of any explanatory value. In contrast, topicality is a well-grounded and widely accepted feature in its own right, as is the aboutness requirement on relative clauses. Explanations for hierarchy effects in the acquisition of relative clauses are not enhanced by invoking salience in any of its many senses.

INFLECTION

It has long been a point of consensus that inflectional markers are acquired with delay and difficulty compared to lexical morphemes, in both first and second language acquisition (Brown, 1973; Dulay & Burt, 1973; Goldschneider & DeKeyser, 2001). This state of affairs is typically attributed, at least in part, to the low phonetic salience of grammatical morphemes. We believe that this idea is on the wrong track, for reasons that we outline below, and that processing-based considerations offer a more promising account of the facts. The English third-person singular suffix *-s* (*He works hard*, *She likes math*) is a case in point.

Agreement in English

It is well known that verbal *-s* is mastered late in the course of both first language acquisition and second language learning. The delay has long been attributed, at least in part, to the low acoustic salience of *-s* (DeKeyser, 2016, p. 354). A problematic feature of this account is that there is no reason to think that learners have trouble hearing word-final *s* in general: as far as we know, normal three- and four-year olds can easily distinguish *no* from *nose*, and *sick* from *six*.² Indeed, there is quite direct evidence that much younger children are sensitive to the presence or absence of the *-s* suffix.

Soderstrom et al. (2002) conducted a preferential listening task with 28 English-speaking infants aged 18.4 – 19.6 months that focused on the agreement contrast in pairs of sentences such as the following.

- (15)a. At the bakery, a team bakes the bread.
 b. At the bakery, a team bake the bread.

The infants listened longer (9.8 versus 8.2 seconds) to sets of sentences that manifested verbal agreement than to those that didn't, indicating an awareness of the agreement suffix and of its appropriateness in at least certain contexts; see also Shi (2014). Brown (1973, p. 410) once observed that 'the child will not learn what [s/he] cannot hear;' see also Cazden & Brown (1975, p. 303). This is obviously true, but it appears that children can hear more than we once thought.

Why then do learners appear to have difficulty acquiring verbal *-s*? We believe that the answer lies in two simple facts, one relating to linguistic typology and the other to language learning. First, as Schacter (1985, p. 71) notes, languages employ different 'coding strategies' to distinguish a subject from other arguments in the sentence; word order, verbal inflection and case marking—alone or in combination—are all commonly used for this purpose, depending on the language. Second, as outlined by Bates & MacWhinney (1987), the processing operations (or 'routines') needed to implement these strategies vary in strength depending on the availability and reliability of the corresponding cues—the key insight of what has come to be called the Competition Model. English offers an illustrative example.

English employs (at least) two separate morphosyntactic strategies for encoding and decoding non-pronominal subjects: word order (the subject tends to precede the verb) and verbal inflection (present tense verbs agree with a third-person singular subject).

- (16) Marvin works hard.
 ↑ ↑
 pre-verbal *inflection*
 position

For the sake of exposition, we can formulate the relevant processing routines very schematically, focusing just on the particular morphosyntactic cue to which they are sensitive, in the spirit of the Competition Model.

- (17) The word order routine:
 NP V ...
 ↓
 Subject

- (18) The inflection-based routine:
 V-*s*
 ↓
 3.Sg Subject

A key feature of processing-based approaches to language is that processing routines are strengthened to varying degrees in the course of use (e.g., Bates & MacWhinney, 1987; Langacker, 1985, p. 59; Hershensohn, 2009; Paradis, 2004; O’Grady, 2015a,b). Assuming that (all other things being equal), frequency of activation is the major determinant of a routine’s strength, the word order routine should be more deeply entrenched than the agreement routine. Roland, Dick & Elman (2007) report that about 95% of all sentences in the Switchboard corpus have the subject in pre-verbal position—a rate of occurrence that is far higher than that of verbal *-s*, which is found only when the subject is third-person, singular and the verb is in the present tense.

Let us assume a ‘stronger first’ approach to the activation of competing processing routines: all other things being equal, the stronger routine will be more easily accessible. Under these circumstances, we will further assume that activation of the second, weaker routine is commonly pre-empted, as a way to reduce processing cost. Let us call this Activation Avoidance.³

- (19) Activation Avoidance
 Under conditions of stress on the processor’s resources, language users tend to rely on stronger processing routines and to avoid activation of weaker ones.

This idea is compatible with two striking developmental facts involving agreement in English.

First, there is evidence that the *-s* suffix is underused rather than overused by learners. Two- and three-year-olds often fail to employ the *-s* suffix (Activation Avoidance), but they rarely produce it where it is not called for (Keeney & Wolfe, 1972; Wexler, 2011; Lukyanenko & Fisher, 2014). The situation for second language learners appears to be similar: agreement errors tend strongly to consist of omissions rather than the overuse of *-s* (Haznedar & Schwartz, 1997, for child L2 learners and Prévost & White, 2000, for adult learners).⁴ These facts align well with the idea that inflectional errors reflect a reluctance to activate a weak routine rather than the absence of the routine or a mistake in how it is formulated.

Second, there are indications of greater attention to the agreement routine in production than in comprehension. Whereas success in the use of the third-person singular suffix reaches the 90% criterion on elicited production tasks around age 4;0 or earlier (Rice & Wexler, 2002; Johnson et al., 2005:326), the ability to exploit this suffix for the purposes of comprehension appears to emerge more slowly. In a study of 62 children aged 3 to 6, Johnson et al. report that it was not until age 5 or later that their participants were able to use the agreement marker at even above-chance accuracy to interpret sentences such as *The cat sleeps on the bed* versus *The cats sleep on the bed*; see also Legendre et al. (2014). This too makes sense. Success in production requires the activation and use of even weak routines. An English sentence that is produced without attention to agreement is noticeably unacceptable (**He go there every day*); in contrast, failure to activate the agreement routine in comprehension is essentially without consequences, since the stronger word-order-based routine gives the right interpretive result in the vast majority of sentences.

In sum, while it is true that various inflectional suffixes in English, including verbal *-s*, are low in acoustic salience, this may not be responsible for their late mastery. As we have argued, there is reason to think that delays in the use of verbal *-s* reflect a reluctance to activate weak routines when processing resources come under stress. As we will see next, the study of case in Korean provides support for this account.

Case in Korean

Korean makes use of two morphosyntactic coding strategies to distinguish subjects from direct objects. On the one hand, the subject usually precedes the direct object (Korean is an SOV language); on the other hand, the subject is typically marked by the nominative case suffix (*-ka*) and the direct object by the accusative suffix (*-lul*).

- (20) Thokki-**ka** oli-**lul** anacwu-eyo.
 rabbit-NOM duck-ACC hug-SE
 ‘The rabbit is hugging the duck.’

As we will see shortly, when there is a conflict between the two strategies, priority goes to case marking.

We can represent the processing routines for Korean case and word order in schematic form as follows.

(21) The word order routine:

NP	NP	V
↑	↑	
<i>Subj</i>	<i>Dir Obj</i>	
<i>(agent)</i>	<i>(patient)</i>	

[except where over-ruled by the case-marking routine]

(22) The case-marking routine:

NP-NOM ↔ *subject (agent)*

NP-ACC ↔ *direct object (patient)*

Salience is not in play here in the way that it might potentially be in the case of the verbal suffix *-s* in English. Case markers in Korean are no less perceptible than other morphemes with the same phonological composition: *hwa-ka* ‘anger + nominative case’ has exactly the same pronunciation as the compound *hwa-ka* ‘picture-person’ (‘artist’), in which *ka* is a lexical morpheme (with the meaning ‘person’) rather than a case marker. Similarly, *han-ul* ‘grudge + accusative case’ is pronounced just like *hanul* ‘sky’ (a single bi-syllabic morpheme, with no case marker).

From a processing perspective, though, there is good reason to think, based on frequency of activation, that the case-based routine is substantially weaker than the routine based on word order. That is because case is commonly dropped in Korean, especially in casual speech: based on longitudinal data from three mother-child dyads, Cho (1981, pp. 45-46) reports that mothers use the accusative case only about 3% of the time and the nominative slightly more than half the time (54.1%) in SOV and OSV patterns. In contrast, word order is highly reliable in these constructions, with SOV patterns occurring about ten times more frequently than their OSV counterparts (Cho, p. 35).

Let us now turn to two concrete examples. In SOV sentences, where the first NP carries the nominative case and the second NP is marked by the accusative, the two routines yield the same result.

(23) Thokki-**ka** oli-**lul** anacwu-eyo.

rabbit-NOM duck-ACC hug-SE

Case: *Subject* *Dir Obj*

Word order: *Subject* *Dir Obj*

‘The rabbit is hugging the duck.’

In an OSV sentence, in contrast, the two routines diverge: the weakly entrenched case-sensitive routine treats the first NP as the direct object by virtue of the accusative case marker, while the word-order routine treats it as the subject by virtue of its position.

- (24) Oli-lul thokki-ka anacwu-eyo.
 duck-ACC rabbit-NOM hug-SE
Case: *Dir Obj* *Subject*
Word order: *Subject* *Dir Obj*
 ‘The rabbit is hugging the duck.’

In such situations, the language learner faces a challenge, as the stronger word-order routine must yield to the weaker case-based routine when the two conflict; see the formulation of (21). But, crucially, the conflict can arise only if the case routine is activated in the first place. We predict that it often will not be, because of learners’ propensity to avoid recourse to weakly entrenched procedures. Korean thus offers a crucial test for our hypothesis.

A key piece of evidence comes from studies in which participants indicate their understanding of sentences such as (24) by matching them with one of two pictures, as illustrated in Figure 6.

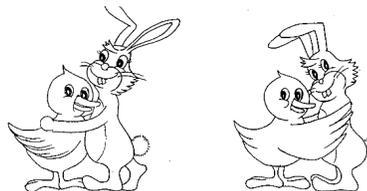


Figure 6 A sample picture, from Song et al. (1997)

Children learning Korean as a first language typically do poorly on such tasks, misinterpreting OSV patterns as if they were SOV sentences, but not vice versa (Cho, 1981; Chung, 1994; Jin et al., 2015). Similar problems have been documented for child heritage learners (Song et al., 1997; Kim et al., in press) as well as for beginning adult learners of Korean as a second language (Ha, 2012; Ha & Choi, 2012). There is thus good reason to believe that the case routine is ineffectual in the early stages of development, as we predict.

Avoidance of weakly entrenched case routines appears to underlie two further developmental phenomena in Korean. First, Kim (2014, p. 68) reports evidence that case is underused rather than overused in children’s speech. When 21 child learners of Korean as a first language aged 3;6 to 6;0 were asked to describe pictures of transitive events in which one entity acted on another, they spontaneously produced the nominative case 77.78% of the time and the optional accusative 42.86% of the time on average. Crucially, they never replaced either case by the other. A comparable trend was observed for 31 heritage learners, aged 8-14, who Kim also studied. This propensity for omission rather than misuse parallels the pattern observed for verbal agreement in English, and is compatible with the idea that weak routines are often not activated.

Second, we find a difference between production and comprehension parallel to the one documented for the English verbal suffix. Success in production calls for activation of the case routine, especially for subjects of transitive verbs, for which case-marking is

typically required. In contrast, attention to case in the course of comprehension has a much lower priority since word order typically suffices to identify the subject and direct object, as we have seen. This contrast is clearly reflected in the performance of 9 ‘mid-proficiency’ learners of Korean as a first language (mean age 4;9) in Kim’s study. Although the children performed at chance (46%) on OSV patterns in a comprehension task based on picture selection (p. 57), they *produced* the nominative case on the subject over 80% of the time when describing pictures of transitive events (p. 68). Large asymmetries of the same type were also noted for the 31 heritage language learners who Kim studied.

Summary and further challenges

In sum, there is good reason to question salience-based accounts for developmental delays in the use of inflection. Although many inflectional markers are acoustically weak (verbal *-s* in English is a prototypical example), their emergence follows a path that is identical in key respects to that of far more salient grammatical morphemes, such as the case markers of Korean. All have essentially the same signature profile: (i) competition of the inflectional routine with a stronger routine, (ii) underuse (but never overuse) of the inflectional routine, and (iii) a greater incentive to activate the routine in production than in comprehension. These facts jointly point toward the reality of Activation Avoidance: under conditions of processing stress (the normal state of affairs for learners), weak routines are less likely to be activated, especially when a stronger routine can be invoked. Acoustic prominence is essentially irrelevant; the explanatory burden falls largely on the operation of the processor and the degree to which its routines are entrenched at different points in development.

Still, many challenges remain. One involves the question of whether inflection-based routines always lag behind a routine that exploits word order—a potential (and undesired) salience effect, since word order is arguably more noticeable than a suffix. Turkish is highly relevant in this regard.

Word order seems to be less fixed in Turkish than in Korean. According to a corpus study conducted by Slobin & Bever (1982), more than 50% of the sentences with an overt subject and direct object occur in a word order other than the ‘canonical’ SOV pattern (see also Özge, Marinas & Zeyrek, 2013, p. 272). (In contrast, SOV patterns outnumber OSV patterns by a factor of 10 to 1 in Korean maternal speech.) In addition, case in Turkish is simpler than in Korean: there is an accusative suffix, but no nominative.

- (25) Goril aslan-**i** bul-du. (Özge et al., p. 272)
 gorilla lion-Acc find-Pst
 ‘The gorilla found the lion.’

Under these circumstances, it seems reasonable to suppose that the accusative case routine takes on a greater importance and that its frequent activation could contribute to its early entrenchment, making it less likely to be pre-empted by routines based on word order.

Interestingly, the developmental facts for Turkish point in precisely that direction, as shown by the results of an act-out comprehension task conducted by Slobin & Bever with 48 monolingual children aged 2;00 to 4;4. The authors report a success rate greater than 75% on OSV patterns, even among two-year-old participants! This finding appears to confirm the possibility of the early entrenchment of inflectional routines under the right circumstances, as our approach predicts.

A second issue stems from the large number of studies in the literature that purport to show the effect of acoustic salience on inflectional development. The problem here is that apparent salience effects are often confounded with processing effects, as in the case of verbal *-s* in English, making it difficult to determine exactly what is going on. Brown, Pfeiler et al.'s (2013) study of the development of agreement in four Mayan languages offers an additional example in this regard. The authors report a robust effect of affix position and prosodic prominence: suffixes, which are stressed in Mayan, are acquired earlier than prefixes, which are unstressed. However, the authors themselves acknowledge the possibility of an alternative processing-based account: Cutler, Hawkins & Gilligan (1985) draw on a broad range of typological facts to argue that stems are best processed before affixes, thereby conferring an advantage on suffixes over prefixes.

Yet another issue involves the large number of inflectional contrasts for which there are no competing word order routines—gender, number (plurality), tense and definiteness all come to mind in this regard. Developmental delays have been reported for these phenomena at least from the time of Berko's (1958) pioneering work, but it is not clear why this should be so on our account, since there is apparently no competing routine.

A possible answer can be derived from a telling typological fact: in many languages, basic semantic contrasts are not encoded morphologically. For example, the following sentence from Thai provides no marking for case, agreement, number, gender, tense or definiteness. The context determines whether the verb should be given a past or a present interpretation, and whether *khon* should be interpreted as singular or plural, as definite or indefinite, and so on.

- (26) chạn hễn khon
 I see person
 'I see/saw a/the person/people.'

We see a similar situation in Indonesian and Malay, which together have more than 200 million speakers. As the following sentence (identical in the two closely related languages) helps illustrate, there is no inflectional marking of any sort.

- (27) aku mem-baca buku
 I active-read book
 'I am reading/did read a book/books.'

In languages of this type, pragmatic reasoning is paramount: listeners draw on information from the context and the situation to locate an event in time, to ascertain

whether a noun has more than one referent, to infer whether it is definite, and so on. In principle, exactly the same option is available to learners and speakers of any language, including English. Herein may lie the ‘competition’ that initially impedes attention to morphosyntactic cues such as definite articles, tense suffixes, and the like. We leave this possibility for future research.

CONCLUSION

We do not deny that some things can ‘stand out’ from others because of their acoustic, visual, or conceptual features. Nor do we deny the plausibility of Brown’s (1973, p. 409) surmise that salience will turn out to be a ‘minor determinant’ of developmental order. But that is not the question; the question is whether salience plays a crucial role in shaping naturalistic development. Obviously, nothing can be ruled out at this point. The literature abounds with examples of apparent salience effects, a number of which receive attention in the other chapters of this volume. It remains to be seen to what extent these effects might lend themselves to reanalysis in terms of processing-related factors.

Of necessity we have had to focus here on three case studies, each involving a major milestone in the acquisition of language: learners’ early mastery of reflexive pronouns, preferences in the production and comprehension of relative clauses, and the emergence of verbal and nominal inflection. As we have noted, the developmental trajectory for these phenomena appears to be shaped by a calculus of processing cost that is sensitive to two factors. On the one hand, there is the burden that particular operations place on internal computational resources such as working memory—a key factor in understanding why reflexive pronouns and relative clauses have the particular properties that they do and why those properties emerge in the way that they do. On the other hand, there are external factors relating to the opportunities that input provides for particular processing routines to be strengthened and ultimately entrenched—a factor of potential relevance to phenomena of all types, including the inflectional contrasts on which we have focused here.

Despite several decades of intense study, most aspects of language acquisition remain mysterious, and even modest attempts at explanation typically fail to muster a consensus. Indeed, progress in the field is arguably more often marked by figuring out what doesn’t have explanatory import than what does. We have followed this path here by calling into question the role of salience in shaping development. Our conclusion, put simply, is that it has little impact, if any. Hopefully, time and further research will clarify this matter.

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NOTES

1. McDaniel et al. (2015) offer a somewhat different processing-based account based on sentence planning. Although they use the term 'saliency' in stating their hypothesis (see their 'property 2'), that notion is implemented in structural and computational terms that are fully compatible with the sort of processing-based approach that we advocate.
2. Intriguingly, the same is true in the case of individuals whose inflectional difficulties stem from specific language impairment (e.g., Pinker 1994, p. 325).
3. There is no reason to think that the conditions that discourage activation of weak routines are limited to the early stages of first and second language acquisition. They could very well also be associated with specific language impairment and neurological disorders such as agrammatic aphasia.
4. Indeed, underuse of inflectional marking seems to be the default state of affairs across many languages (see, e.g., Hyams, 1999). It is important not to confuse the suppression of a morpheme with the overgeneralization of an allomorph of that morpheme. There is no incompatibility between the fact that the past-tense suffix is often dropped by children learning English and the fact that, *when the suffix is used*, there is a tendency to overgeneralize its most basic allomorph (-ed, as in *runned*, *goed*, *eated*, and so on).

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