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A large-scale cross-linguistic investigation of the acquisition of passive

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ABSTRACT

This cross-linguistic study evaluates children's understanding of passives in 11 typologically different languages: Catalan, Cypriot Greek, Danish, Dutch, English, Estonian, Finnish, German, Hebrew, Lithuanian, and Polish. The study intends to determine whether the reported gaps between the comprehension of active and passive and between short and full passive hold cross-linguistically. The present study offers two major findings. The first is the relative ease in which 5-year-old children across 11 different languages are able to comprehend short passive constructions (compared to the full passive). The second and perhaps the more intriguing finding is the variation seen across the different languages in children's comprehension of full passive constructions. We argued, based on the present findings, that given the relevant linguistic input (e.g., flexibility in word order and experience with argument reduction), children at the age of 5 are capable of acquiring both the short passive and the full passive. Variation, however, stems from the specific characteristics of each language, and good mastery of passives by the age of 5 is not a universal, cross-linguistically valid milestone in typical language acquisition. Therefore, difficulties with passives (short or full) can be used for identifying SLI at the age of 5 only in those languages in which it has already been mastered by typically developing children.

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1. Introduction

The passive is a complex construction in which the external argument (typically with the agent theta role) is backgrounded, while the internal argument (typically with the theme or patient theta role¹) of the verb is foregrounded. This is accomplished by the internal argument of the active construction being promoted to the subject position, while the external argument is demoted to be oblique, or becomes null, resulting in a noncanonical word order. Since the 1960s (Turner & Rommetveit 1967) children's acquisition of the passive construction has received much attention (e.g., Bever 1970; Bowerman 1982; Gordon & Chafetz 1990; Harris 1976; Maratsos 1974; Maratsos & Abramovitch 1975; Maratsos et al. 1985; Marchman et al. 1991; Pinker, Lebeaux & Frost 1987; and many others). These studies, and others,

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Color versions of one or more of the figures in the article can be found online at www.tandfonline.com/hlac.

¹In what follows, we will not make a distinction between theme and patient theta roles. We refer the arguments of a transitive verb as internal and external arguments, leaving aside the type of theta role they may bear.

found that short passives, without an overt external argument, are easier than full passives with an overt external argument (the *by*-phrase in English) in some languages. It was further found that there seem to be cross-linguistic differences with respect to the timing of acquisition of passives.

To further explore these observations, in this article we investigate the acquisition of full and short passives by 5-year-old children in 11 languages from three different language families that differ in the way they construct passives: Catalan, Cypriot Greek,² Danish, Dutch, English, German, Lithuanian, and Polish (Indo-European), Estonian and Finnish (Finno-Ugric), and Hebrew (Afro-Asiatic). We report two experiments, using uniform items and methods, to compare children's comprehension of passives across all 11 languages, and furthermore we compare comprehension of short and full passive within and across 8 of these languages. We investigate whether we observe language variations among the languages in our study. If we observe that children of the same age group have similar difficulties across languages (hence exhibit similar pattern in responses), the difficulties that children have are not caused by some specific morphosyntactic properties of the languages in our study. By investigating languages from different language families, we try to evaluate whether a common feature implicates the difficulties children may or may not have, regarding the acquisition of passives.

This large cross-linguistic study allows us to systematically explore the acquisition of the passive construction and show that:

- (1) Children's comprehension of passives is adultlike, by the age 5, although acquisition of some languages cause children to lag behind.
- (2) Children comprehend short passives better than full passives at age 5.

This article also has a methodological goal: to develop guidelines for investigating the acquisition of passive construction across languages. Such guidelines are desirable, since passive sentences pose problems for children with Specific Language Impairment (SLI) in English (Bishop 1979; Bishop et al. 2000; Fletcher et al. 2005; Pearson & Roeper 2004; Van der Lely 1990, 1996). Furthermore, passive sentences are used in English standardized tests of language development, e.g., Test of Reception of Grammar (TROG, Bishop 2003), the Diagnostic Evaluation of Language Variation (DELV, Seymour et al. 2005), and language tests specifically designed to identify children with/at risk for SLI, i.e., the Grammar and Phonology Screening Test (GAPS, Van der Lely et al. 2007). Thus, by establishing a way to evaluate children's understanding of passive in various languages, some of which have not been studied before, we hope our study may contribute to the development of assessment materials for SLI in these languages.

2. The structure of the passive

The passive construction can be characterized as follows (Siewierska 2011):

- (1) Passive has an active counterpart.
- (2) The internal (accusative) argument of the active is promoted to be the subject of the passive construction (receiving nominative case in many languages).
- (3) The external (nominative) argument of the active is demoted to be the oblique phrase and is expressed overtly only optionally.
- (4) The passive uses a special (verbal) morphology.

Passive of transitive verbs is characterized by a reduction of the external argument in all languages studied here. In Estonian and Finnish, the reduced external argument cannot

²Cypriot Greek is a dialect of Greek spoken in Cyprus. While it shares most language features with Standard Modern Greek spoken in Mainland Greece, it also differs in specific aspects of phonology, morphology, and syntax, which makes Cypriot Greek a distinct dialect from Standard Modern Greek (see Kambanaros & Grohmann [2010] for discussion on the differences between the two dialects).

be overtly expressed.³ In other languages, the external argument becomes oblique and optional.

The subject of the passive construction is the internal argument of its active counterpart in all the languages studied here, which has accusative case (or n-accusative in the case of Finnish and Estonian) in active. The subject of the passive construction has nominative case. The case of the argument is overtly expressed in Cypriot Greek, German, Lithuanian, and Polish. In Finnish and Estonian, the theme argument retains the case of the active construction (the partitive) in the dynamic passive. Thus, what distinguishes the active from the passive voice in Finnish and Estonian is the morphology of the verb. When a productive full passive is used, the external argument is marked by a preposition, with or without a change in case, in all languages tested except for Lithuanian, where the genitive case marker is used (without preposition). For concreteness, we assume that the internal argument of the transitive verb is base generated as complement of the verb in all the languages (Universal Theta-Role Assignment Hypothesis [UTAH], Baker 1988). Because the verb does not license the case of its internal argument when passivized, the internal argument must raise to the subject position (the specifier position of IP/TP) for case. It is standardly assumed that this movement is A-movement (Chomsky 1981).

Passive morphology may present itself in two different ways:

- (1) Verbal Morphology.
- (2) Other morphological markers.

In the case of verbal morphology, there are at least two ways to construct a passive sentence: (1) with a suffix specific to passives on the verb (Cypriot Greek, Estonian, Finish, Hebrew, Lithuanian, and Polish in our study); and (2) periphrastically with an auxiliary verb (Dutch, English, and German in our study). Some languages have both types of passives, as in Danish (and Catalan), as shown in (1).⁴

(1)	a. Active:	Lillesøster	kysser	mor.
		Little.sister	kiss.PRES	mother
		'Little sister kisses mother'		
	b. Morphological Passive:	Lillesøster	kysses	(af mor).
		Little.sister	kiss.PASS	(by mother)
		'Little sister is kissed (by the mother)'		
	c. Periphrastic Passive:	Lillesøster	bliver	kysset (af mor).
		Little.sister	become PRES	kiss.PTCP (by mother)
		'The little sister is kissed (by the mother)'		

In some languages, the passive construction is uniquely identifiable because of other morphological characteristics, e.g., a unique preposition (*al yedey* literally 'on the hands of' used only in the passive in Hebrew; the auxiliary verb used in one form of passive construction in Catalan (*ésser* 'to be'); combination of certain auxiliary (such as *werden* 'become' in German) and past participle; unique passive morphology in Estonian, Finnish, Lithuanian, and Polish; and so on. In these languages, therefore, the use of these particular morphological means indicates unambiguously that the sentence is in passive voice.⁵

For the present study, the following forms were used, demonstrating the cross-linguistic variation depicted earlier:

³The type of construction that was used in Estonian is called "impersonal construction."

⁴In our study, we used the periphrastic passive in both Catalan and Danish.

⁵On the other hand, some lexical items used in the passive construction may be used in constructions other than the verbal passive: The past participle is used in verbal and adjectival passives in, e.g., Catalan, English, Dutch, and German, among others; the past participle is also used in perfective aspect in, e.g., English, Dutch, German, and others; in Hebrew, the morphology for passives and resultatives take the same morphological form in the present tense; the form of past tense and past participle are identical in English; and so on.

- (2) Languages with only the short passive structure:⁶

a. **Cypriot Greek**

I mitʃia koroua eksetazete.
the little girl.NOM examine.PASS.PRS.3.SG
'The little girl is examined'

b. **Estonian**

Väikest õde kuulatakse.
little.PART sister.PART examine.IMPERS.PRS
'The little sister is examined'

c. **Finnish**

Pikkusisko/ Pikkusiskoa tutkitaan.
Little-sister.NOM / little-sister.PART examin.PASS.PRS
'Little sister is examined /is being examined'

- (3) Languages with the short and the full passive structure:

a. **Catalan**⁷

La germana petita és auscultada.
the.FEM girl little BE.PRS.3.SG examine.PTCP.FEM
(*per la mare*).
(by the.FEM mother)
'The little girl is examined (by mother)'

b. **Danish**

Lillesøster bliver undersøgt (af mor).
Little.sister become examine.PTCP (by mother)
'Little sister is being examined (by mother)'

c. **Dutch**

Het kleine meisje wordt onderzocht (door mama).
the little girl become.3.SG examine.PTCP (by mother)
'The little girls is being examined (by mother)'

d. **English**

The little girl is examined (by mom).

e. **German**

Das kleine Mädchen wird (von der Mama) untersucht.
the.N.SG.NOM little girl become.3.SG (by the.F.Dat mother)
examine.PTCP
'The little girl is being examined (by the mother)'

f. **Hebrew**

Ha-yalda ha-ktana nivdeket (al-yedey ima).
The-girl the-little examine.PASS.PRS.SG.FEM (by mother)
'The little girl is examined (by mother)'

g. **Lithuanian**

Maža mergaitė
Little.FEM.SG NOM girl FEM.SG NOM
Tikrinama (mamos)
examine.PASS.PART.IMPERF.PRS.FEM.SG.NOM (mother.GEN)
'The little girl is being examined (by mother)'

h. **Polish**

Mała dziewczynka jest badana (przez mamę).
little.FEM.SG.NOM girl.NOM be.PRES.SG.3
examine.PASS.PART.IPFV.SG.FEM. (by mother.ACC)
'The little girl is (being) examined (by mother)'

⁶The term *sister* and *girl* are used, depending on the form that was found to be more appropriate for testing in each language.

⁷There are two types of passives in Catalan. One is the periphrastic passive, used in this experiment, and the other is a passive using a clitic *es*, which is homophonous with a reflexive clitic, and because this type of passive does not allow the external argument to be overtly expressed, we chose the periphrastic passive for this experiment.

Before moving on, let us mention some differences between verbal and adjectival passives. The verbal passive is used to describe an event that develops over time either toward an inherent culmination moment or continuously (the perfective [with a known end point] and imperfective [ongoing or unmarked] passives), while the adjectival passive is used to describe the outcome of an event or the state of affairs of the object following an event. In most languages investigated in this article, adjectival and verbal passives are morphologically distinct (except in Hebrew in present tense and Finnish). Yet, in some of the languages, the distinction may be rather vague. In Polish, for example, the most frequently used form of the adjectival passive shows a lack of concord between the aspect of the participle, which is typically perfective, and the auxiliary ‘be,’ which is inherently imperfective. In Polish verbal passives, however, the aspect of the auxiliary and of the participle must agree: In the present tense only the imperfective participle can be used, while in past and future tense both aspects are possible. Therefore if the perfective participle is chosen, the auxiliary must be the perfective verb ‘become.’ This is also evident in Lithuanian. To avoid these complications, we used the present tense in all languages under study.

3. The acquisition of passive

3.1. *Previous studies of children’s acquisition of passives*

For more than half a century, the noncanonical word order, the passive’s unique morphology, and the cross-linguistic variations in the way the passive is composed led to extensive interest from child language acquisition researchers. Turner & Rommetveit (1967) discovered that children find the passive difficult to understand and produce, with imitation preceding comprehension and productive use. Baldie (1976) further reported that whereas children can use and comprehend passives by the age of 3, full passives and passives with nonactional/psychological verbs (e.g., *see*, *love*, etc.) are not acquired until school age (see also Bever 1970; Bowerman 1982; Gordon & Chafetz 1990; Harris 1976; Maratsos 1974; Marasos & Abramovitch 1975; Maratsos et al. 1985; Marchman et al. 1991; Pinker, Lebeaux & Frost 1987). Previous studies regarding the acquisition of passives have identified the following characteristics of children’s passive acquisition:

- (1) Passive acquisition is delayed compared to that of actives.
- (2) Short passives are acquired earlier than full passives.
- (3) Nonreversible passives are acquired earlier than reversible passives.
- (4) Actional passives are acquired earlier than nonactional passives.

Actives sentences are known to be among the first acquired by children, whereas the other three characteristics need further explanations.

Previous comprehension studies have not consistently tested whether short passives are acquired earlier than full passives, and in some cases (for example English), results explicitly suggest that children do not differ in their comprehension of short and full passives (Gordon & Chafetz 1990; Maratsos et al. 1985; Hirsch & Wexler 2006, among many others.) Production studies, by contrast, suggest that at the initial stages of the acquisition of passives, children are likely to use short passives rather than full passives (Fox & Grodzinsky 1998). Israel, Johnson & Brooks (2001) analyzed longitudinal corpora from CHILDES and mapped out the production of passives in English-speaking children aged 1;08–5;00. They observed that the functions that children attribute in their passive use change in early development proceeding from adjectival and stative use (describing states) to eventive use (describing events). The suggestion from this study is that children build on their prior knowledge of adjectival and stative participles, and the availability of these forms in the language can explain the different rates of acquisition across different languages.

Furthermore, nonreversible passive sentences are understood earlier than reversible passive sentences (Bever 1970; Strohner & Nelson 1974; Van der Lely & Dewart 1986). It was argued that nonreversible passive sentences (*the bone was eaten by the dog*) are less challenging because world knowledge facilitates children's identification of the external and internal arguments, whereas the interpretation of the passive in reversible sentences (*the dog was eaten by the fox*) requires full grammatical knowledge. However Aschermann, Gültzow & Wendt (2004) were not able to replicate this pattern cross-linguistically when comparing German-speaking and English-speaking children's performance. They propose that since German is a V2 language with a more flexible word order (including sentence-initial NPs that are not the external argument), experience with German may help children map the sentence-initial NP onto the internal argument in the reversible passive structure. In English, on the other hand, the word order is quite rigid, and hence, the sentence-initial NP is more likely to be the external argument.

Turning to why passivization of nonactional verbs, such as *see*, *think*, *know*, *frighten*, and *scare*, is comprehended later than actional passives (Gordon & Chafetz 1990), authors such as Pinker, Lebeaux & Frost (1987) argue that younger children are more likely to use passives with prototypically transitive scenes (transitive actions carried out by an animate agent), than with nonprototypical arguments, but this does not imply that young children's passives are all adjectival. From the point of view of English passives, these authors argue that the difficulty with passivized psychological verbs cannot be explained as an inability to derive an adjective from these verbs, since many psychological verbs easily form adjectival passives (e.g., John seems embarrassed), while many actional verbs make only questionably well-formed adjectivals (e.g., ?*John seems punched). It is suggested that the passive applies first and foremost to verbs, which have a theme role for their objects, so children have to learn which nonactional verbs are passivizable in their language on a class-by-class basis driven from positive evidence in the input. They further showed that children's production of passives increased when the input was increased under experimental conditions, thus indicating the effects of learning.

3.2. Previous accounts of children's acquisition of passives

Several theories have been proposed to account for the delay in children's acquisition of passives relative to their acquisition of actives. These can be categorized into two main approaches:⁸ (1) the lack of input approach, and (2) the delay of grammatical knowledge (such as A-movement).

Gordon & Chafetz (1990) pointed out that passive constructions in general appear infrequently in the input to children. Only 0.4 % of the speech addressed to English-speaking children consists of passive constructions of any kind, hence an additional question related to children's passive acquisition is: How are they able to acquire a structure that they barely hear? Furthermore, differences in frequencies of passive use among languages have been claimed to be closely associated with input. Comparing variance in input across languages, Allen & Crago (1996) showed that while English-speaking adults use, on average, 1.1 passive constructions per hour, Sesotho-speaking adults use, on average, 2.74 constructions per hour, whereas Inuktitut-speaking adults produce, on average, 8.9 constructions per hour. Reflecting this pattern, children speaking Sesotho and Inuktitut produced more passives per hour than English-speaking children. Demuth (1989) and Demuth, Moloi & Machobane (2010) observe that, around the age of 3, Sesotho-speaking children not only produce full passives but also comprehend them and can generalize the passive formation mechanism to novel verbs. Demuth (1990) suggested that this is because passives are more frequent in Sesotho, and the unique passive morphology of Sesotho helps the children acquire the passive at an earlier age. Similar

⁸Although it has been observed that passive sentences are more demanding to process (longer reaction time and more mistakes) compared to active sentences (Hirsch & Wexler 2006), it is unclear how we can control for language variations following this hypothesis. We therefore do not address this approach here.

early acquisition of passives has been found in Inuktitut-speaking children (Allen & Crago 1996) and in Indonesian-speaking children (Gil 2008). Support of the input approach also comes from Brooks & Tomasello's (1999) experimental training study, where they showed that English-speaking children as young as 3 can learn to use passives and even productively extend their use to novel verbs they had never heard before. Yet, Crawford (2004, 2005) showed that in an experimental setting, there was no significant difference between the performance of English-speaking children and that of Sesotho-speaking children. This casts doubt on the possibility that the frequency of passive construction in the input is the sole cause of the variation in children's acquisition of the passive construction.

Turning to children's late acquisition of full verbal passives, researchers have attributed this to children's lack of various syntactic means necessary to construct a passive. These include A-movement (Borer & Wexler 1987 and Babyonyshev et al. 2001, but see Stromswold 1996; Hyams & Snyder 2005; Shimada & Sano 2007; Friedmann 2007), transmission of the external theta role of the VP to the by-phrase (Fox & Grodzinsky 1998),⁹ or more recently, a subset of A-movement (Kirby 2010, but also see Hirsch, Orfitelli & Wexler 2008), or *phase*, as proposed within the Minimalist program (Wexler 2004). Furthermore, individual variations have been observed. A study of 3–4-year-old Portuguese-speaking children (Rubin 2009) shows that when looking at individual performances, some 3- and 4-year-old children were already at ceiling in comprehending the short and full passive, while others were still at chance level or erroneously comprehended the sentence as active (reversing the theta roles of the external and internal arguments). Although individual variation is not contradictory with a maturation-driven theory, if combined with language variation, it warrants further investigation.

To summarize so far, previous researchers have found that certain passive constructions are acquired earlier, and there may be cross-linguistic and individual variations among children. Researchers have proposed varied theories to explain these differences, such as frequency in the input, maturation of grammar, properties of the target language, and other factors, such as processing. These analyses, however, cannot satisfactorily explain why there should be language and individual variations among speakers. Our hope is that by constructing an experiment that allows investigating passive comprehension in many more languages, with the same task, we can better our understanding of the challenges faced by the children.

If we find cross-linguistic and/or individual variations among children, they lend support to the idea that the delay is not solely caused by grammatical constraints. We hypothesize that some morphological or syntactic properties are responsible for the delay:

- (1) Word order flexibility (Aschermann, Gülzow & Wendt 2004): Children learning languages that allow a structure where the internal argument precedes the verb and the external argument acquires the passive construction earlier than the ones that lack this flexibility.
- (2) Uniqueness of syntactic/morphological characteristics of passives (Demuth 1990): When the passive structure of the language utilizes a unique syntactic/morphological property (e.g., special verbal suffix for the passives, special auxiliary for the passive), children speaking that language acquire the passive construction earlier than those speaking a language with ambiguous forms. There are three areas that may be the cause of uniqueness:
 - (i) Uniqueness of the passive form: The passive in all the languages with periphrastic passives that we investigated in this study used an auxiliary verb in combination with past participle form of a verb to create the passive. The past participle form of a verb is also used in the perfect construction (e.g., *have fed* in English), however. In contrast, the suffixes used to mark passives in morphological passive languages in our study were unique to the passive construction. This predicts that children may acquire the passives in languages with morphological passives earlier than those with periphrastic passives.

⁹The question remains of whether there exists a challenge with transferring the subject's theta role to the by-phrase in all passive constructions or whether this operation is only a challenge in the particular cases in which there is a conflict in theta roles, but this issue is beyond the scope of the present article.

- (ii) External argument may be marked by a preposition (ambiguous [most of the languages in our study] vs. unambiguous [Hebrew]) or by different case from the active form (Lithuanian). We predict that a language with a unique morphological marker of external argument may acquire the passive construction earlier.
- (iii) Uniqueness of the auxiliary: Among the periphrastic passive languages, some languages use different auxiliaries for passives and other constructions such as perfect. We predict that passives are acquired earlier in languages with a unique auxiliary for passives (Catalan) than in languages with an auxiliary verb used in more than one construction (English).

We will evaluate whether these morphosyntactic characteristics can help us identify the cause of potential cross-linguistic variation in children's acquisition of passive constructions. In the following sections, we first discuss the experimental method we used to compare the passive comprehension in 5-year-old children to find empirical answers to the questions outlined earlier, and then discuss the results of the experiments.

4. Method

The experimental study explores 5-year-olds' ability to comprehend two types of passive constructions (short vs. full) in comparison with active constructions. Both correct responses as well as error types will be analyzed in order to provide insight into why passives are acquired relatively late in some languages. The following questions are addressed in the design:

- (1) Are children able to understand both short and full passives by the age of 5?
- (2) Are full passives more difficult to comprehend than short ones?
- (3) Are passives more difficult to learn in some languages than others?
- (4) Do children's errors in comprehending passive constructions show a canonical (agent-verb-theme) interpretation revealed by errors of theta-role reversal?

We attempt to answer these questions by studying children speaking a variety of different languages, while using the same design.

4.1. Participants

In the first experiment, 274 children were tested on their comprehension of short passives and matched active constructions (henceforth the short passive experiment). In the second experiment, 198 children were tested on their comprehension of full passives and matched active constructions (henceforth the full passive experiment). Different children participated in the two experiments. The participating children were all monolingual preschoolers aged between 5;00 and 5;11. They were speakers of 11 languages: Catalan, living in Sabadell, in the Barcelona area; Cypriot Greek, living in Limassol; Danish, living in Aalborg; Dutch, living in Groningen; English, living in London; Estonian, living in Tartu County and in Põlva County; Finnish, living in Oulu; German, living in Berlin; Hebrew, living in the Tel Aviv area; Lithuanian, living in Kaunas; and Polish, living in Kraków and Warsaw. All participants were typically developing with no previous record of any diagnosis for language or developmental impairment.

Our final sample included only children performing above chance on the control (active) tasks (for full explanations see the Results section). Eleven children (4.0%) were excluded from the short passives experiment sample, and 15 (7.5%) from the full passives experiment sample due to chance performance on the active tasks. Descriptive statistics of the final sample are presented in [Table 1](#).

We attempted to match the groups for chronological age and gender, both within and across the two experiments. Some age discrepancies did emerge, however. In the short passive experiment, the Dutch children turned out to be significantly older than all other children, except for Catalan and

Table 1. Participants' age (in months) and gender on the short and full passive experiments.

	Short passives experiment						Full passives experiment					
	M	Med	SD	Boys (N)	Girls (N)	All (N)	M	Med	SD	Boys (N)	Girls (N)	All (N)
Estonian	66.13	66.5	3.49	12	12	24	—	—	—	—	—	—
Finnish	65.61	66	3.59	11	12	23	—	—	—	—	—	—
Greek (CY)	65.52	65	3.16	13	10	23	—	—	—	—	—	—
Catalan	67.29	68	3.58	12	12	24	67.00	67	2.64	11	13	24
Danish	65.14	64	3.69	10	12	22	64.14	64	2.83	11	11	22
Dutch	69.17	70	1.97	11	13	24	65.65	66	3.25	13	7	20
English	66.77	68.5	4.42	11	11	22	68.41	69	3.00	11	11	22
German	66.40	66	3.06	13	12	25	67.32	67	2.84	13	12	25
Hebrew	65.92	65	3.22	12	12	24	65.35	65	3.49	12	11	23
Lithuanian	65.91	67	3.65	11	12	23	65.45	66	3.98	10	10	20
Polish	66.66	67	3.20	14	15	29	65.32	65.5	3.31	13	15	28
TOTAL	66.43	67	3.49	130	133	263	66.09	66	3.37	94	90	184

English. In the full passive experiment, the Danish children were significantly younger than the Catalan, German, and English children. Moreover, Polish children were significantly younger than English ones.¹⁰ There was also one discrepancy between the experiments: The Dutch children taking part in the short passive experiment were significantly older than those taking part in the full passive experiment.¹¹ However, all those discrepancies were small, less than 4 months on average. With respect to gender, there were no significant discrepancies within any sample from the expected 1:1 ratio of boys to girls—this includes the full passive experiment Dutch sample, where boys appeared to have been overrepresented.¹²

4.2. Materials

Both experiments consisted of series of picture-choice tasks and followed identical designs. Participants were expected to choose the one picture (from a set of four) that matched the sentence accompanying the presentation of a given set of pictures. Each experiment consisted of a female and a male version, both of which were presented to all children. In the female version the protagonists were all female (a little girl, a big girl, the mother, and the grandmother) and for the male version the protagonists were all male (a little boy, a big boy, the father, and the grandfather). By introducing female and male versions, we avoided gender differences among protagonists within one item (sentence) that could potentially evoke various additional cues for sentence comprehension (grammatical gender, general knowledge, etc.) apart from the sentence structure. The two versions were counterbalanced for order of presentation for all languages.

All sentences were semantically reversible and contained action verbs with animate protagonists. We opted for a set of transitive, nonreflexive verbs that were as syntactically similar as possible across all the languages tested. Yet, some items/verbs did not meet these criteria in some languages and were not eventually tested or used in the analyses for either linguistic or cultural constraints or administration errors.

Each sentence (active or passive) was paired with a picture depicting the target interpretation along with three mismatched pictures (MM). Each set of pictures depicted three people from a set of four protagonists: Two were directly involved in the action, and one was a neutral observer. The three MM pictures depicted the following events: (1) role reversal of the protagonists, (2) substitution of the internal or external argument by a third person, and (3) lack of any action (see Appendix A for an example of a set of four pictures).

For example, in the short passives task, when the test stimulus was “The little girl is being fed” the following mismatched events were depicted:

¹⁰This was established using ANOVAs with the Games-Howell post hoc test.

¹¹This was established using the independent-samples *t*-test.

¹²This was established with the binomial test.

- (1) Theta-role reversal: The little girl is feeding grandmother.
- (2) Wrong patient: Grandmother is feeding the big girl.
- (3) Neutral: The three protagonists in a neutral state (i.e., just sitting at the dinner table) (lack of any action).

In the full passives task, when the test stimulus was “The little girl is being fed by grandmother,” the following mismatched events were depicted:

- (1) Theta-role reversal: The little girl is feeding grandmother.
- (2) Wrong agent: Big sister is feeding the little girl.
- (3) Neutral: The three protagonists in a neutral state (i.e., just sitting at the dinner table) (lack of any action).

The layout of the four pictures was pseudorandom for each item and the same for all participants, using Latin Square.

The order of items within each version (female or male) was pseudorandom and presented in the same order for all participants across all languages. The entire test was comprised of 22 items, equally divided between the male and female version. However, since some of the items were not appropriate for some languages, children in some languages were administered a slightly shorter test (18–21 items long). Eventually, there were 13 items (6 in the male version and 7 in the female version) that were administered in all languages. All subsequent analyses are limited to these 13 items that were shared across all languages. These verbs consisted of: *carry*, *examine*, *comb*, *cover*, *draw*, *feed*, *hug*, *make up*, *push*, *scratch*, *tickle*, *wash*, *wipe/dry*.¹³

All verbs were presented twice: once in an active sentence and once in a passive sentence, within the same pseudorandom order for all participants. Active sentences were of the same length across both tasks, while the passive sentences differed in length, reflecting the type of the passive that was tested. The first two warm-up sentences were active to verify that the child understood the task. The sentences were prerecorded by a female native speaker with neutral intonation. Appendix B presents the verbs that were used in each of the languages, reflecting the actual order of presentation.

4.3. Procedure

In both experiments children were tested individually by native speakers in their preschools. The children were seated in front of a computer screen next to the experimenter. The experimenter began the session by introducing the eight protagonists (four females and four males) as a big family that enjoys doing many things together. The child was then told that she was going to see the family picture album and that the females mostly like to do things together, and the males mostly like to do things together. The children were then presented with the pictures depicting the female or the male group (in accordance with the picture album they saw), introduced to each character by their cultural appropriate kinship names, and asked to identify each of the protagonists (e.g., “This is the little sister, this is the big sister, this is the mother, this is the grandmother”). The child received help in identifying the characters until the experimenter was confident that the child knew each protagonist. Then the experimenter explained the procedure. The child was told: “Now, let’s see the family picture album; first we’ll see what all the females (or males) are doing” and “The family has recorded something about each of the pictures. I want you to listen carefully and choose the picture that matches what the family has recorded.” The child was encouraged to identify the target picture by pointing to the appropriate picture on the screen. All test stimuli (pictures as well as prerecorded sentences) were presented via a PowerPoint presentation. The child’s picture choice was noted by the experimenter on a score sheet.

¹³Due to an administrative error, the verb *photograph* was substituted for the verb *make up* in the active condition of the English full passives experiment.

5. Results

Since we aimed to investigate the acquisition of passive by children with typical language development, we included only children who performed at ceiling on the control (active) conditions and hence excluded all children whose performance on the active conditions was at chance or below. The chance level was calculated for three pictures: the target picture, the theta-role reversal picture, and the wrong patient picture.¹⁴ This provided us with a chance level of 9 or fewer correct responses out of 13 ($p > .05$ on the one-tailed binomial test, test proportion 50%). This exclusionary criterion eliminated 11 and 14 children from the short and full passive samples respectively, scattered across several languages. The remaining children were likely to be able to identify the protagonist and assign thematic roles correctly under the active condition. Results provided by the remaining children ($N = 263$ and 184 for the short and full passives experiment respectively) are presented in the following.

5.1. Are children able to understand both short and full passives by the age of 5?

Children's performance accuracy on all experimental tasks is illustrated in Figure 1¹⁵ and in Appendix C.

It is apparent that children understood short passives rather well—their average performance on the short passive conditions was above 80% in all languages studied. In the full passives experiment, however, the performance was much more varied across languages, though still significantly above chance in all but one language—Catalan being the exception.¹⁶

Figure 1. Performance accuracy on both experiments. Bars represent means and 95% confidence intervals. Solid bars = active sentences. Dotted bars = passive sentences.

¹⁴The chance level was calculated for three pictures rather than for four, as this criterion was a stronger one for the hypothesis that children answered randomly. The fourth picture, the neutral/control picture (presenting no action but only three protagonists not performing any activity), could be eliminated by children only because there were no action at all, and still the children's choice could remain random. See Section 5.3.2. for details.

¹⁵In this and all subsequent analyses we report actual results unadjusted for chronological age. While significant between-group differences in chronological age did emerge (see Methods section), correlations between age and performance were weak or negligible (all r values lower than .2).

¹⁶One-sample t -test was used to examine this. Performance of the Catalan group was at chance whether the chance level was assumed to be 25%— $t(23) = 1.353$, $p = .189$ —or 33%— $t(23) = 0.102$, $p = .919$. For the assumption beyond those "lenient" and "strict" chance level, see Section 5.3.2.

5.2. Are full passives more difficult to comprehend than short passives?

To answer this question, the results of the two experiments were compared using mixed design ANOVA, with a between-subjects factors of Experiment (two levels: short vs. full passives experiment) and Language (eight levels), and a within-subjects factor of Structure (two levels: active vs. passive sentences). Since the full passives experiment was not performed with Estonian-, Finnish-, and Greek-speaking children, data from those three languages were excluded from the analysis.

The main effect of Experiment (short vs. full) was significant: $F(1,361) = 81.762, p < .001$. It was qualified by significant interactions with Structure: $F(1,361) = 135.035, p < .001$; Language: $F(7, 361) = 10.063, p < .001$; as well as a second-order interaction with both Structure and Language: $F(7, 361) = 13.311, p < .001$. The interpretation of those interactions is as follows. Children comprehend short passives much better than full passives (the difference of nearly 20%: $M_{\text{short}} = 90.99$; $M_{\text{full}} = 71.45$; $t(375) = 8.513, p < .001$). The effect is specific to passives, since on the control active sentences the performance of both groups was virtually identical: $M_{\text{short}} = 94.46$; $M_{\text{full}} = 94.40$; $t(375) = 0.087, p = .931$. Furthermore, the direction and magnitude of the differences in children's performance on short and full passives depended on language. This is summarized in Table 2. Catalan, Dutch, German, Hebrew, Lithuanian, and Polish children tested on short passive sentences did significantly better than those tested on full passive sentences. Those differences were large (12%–51%; Cohen's d measure of effect size = 0.95–1.87; Cohen 1992). The Danish and English groups were the only groups that did not show a significant difference. Surprisingly, English children who were presented with short passive sentences performed *worse* than their same-language peers presented with full passive sentences, though the difference was not statistically significant. Differences in the performance of the same children on the active (control) sentences were much smaller (in the 1%–6% range). Thus, worse performance on full passives that we observed in some languages probably reflects challenges that are specific to full passive constructions; it is unlikely to be a by-product of inferior overall language competence of the children participating in the full passives experiment.

To sum up, our results indicate that comprehension of full passives is indeed harder than short passives, though this does not account for all languages.

5.3. Are passives harder to learn in some languages than others?

The results reported earlier indicate that full passives are indeed harder to learn in some languages than others. However, the ANOVA analysis reported earlier also showed a main effect of Language:

Table 2. Mean % differences and effect sizes (Cohen's d) for differences in the children's performance on the short and the full passive tasks.

		% differences ($M_{\text{short}} - M_{\text{full}}$)	Cohen's d
Catalan	ACT	−0.32	−0.07
	PASS	50.97	1.87***
Danish	ACT	−3.14	−0.56
	PASS	5.94	0.57
Dutch	ACT	2.44	0.30
	PASS	11.92	1.00**
English	ACT	−6.29	−0.83**
	PASS	−5.24	−0.33
German	ACT	1.23	0.19
	PASS	14.16	1.09***
Hebrew	ACT	2.41	0.61*
	PASS	30.09	1.81***
Lithuanian	ACT	−0.80	−0.11
	PASS	36.49	1.42***
Polish	ACT	4.26	0.63*
	PASS	12.26	0.95**

Note. Positive values indicate higher scores on the short passive experiment. ACT = the active condition; PASS = the passive condition.

*** $p < .001$; ** $p < .01$; * $p < .05$; on paired-samples t -test.

$F(7, 361) = 15.527, p < .001$; Structure: $F(1,361) = 250.733, p < .001$; and an interaction between them: $F(7,361) = 28.998, p < .001$. This indicates that the cross-linguistic differences in the mastery of passives affect not only long but also short passages. To explore this fully, two additional factorial ANOVAs were run, separately for the short and the full passive experiments. Both ANOVAs followed the same design: a between-subjects factor of Language (11 levels for the short passive experiment, 8 levels for the full passive experiment), and a within-subjects factor of Structure (2 levels: active vs. passive sentences).

The result for the short passive experiment showed a significant effect of Language: $F(10,252) = 6.106, p < .001$; Structure: $F(1, 252) = 17.751, p < .001$; as well as a significant interaction between them: $F(10, 252) = 5.968, p < .001$. This means that the active sentences were slightly easier than the passive sentences (3% difference: $M_{\text{active}} = 94.18$; $M_{\text{passive}} = 91.23$); that performance differed across 11 languages; and that those two factors were related: The magnitude and direction of cross-linguistic differences depended on the structure. This interaction was explored further with a one-way ANOVA comparing the performance of 11 language groups on the short passive sentences only. It produced a significant effect: $F(10,252) = 6.567, p < .001$. Games-Howell post hoc analyses revealed that the two lowest-performing groups—English and Cypriot Greek—were both significantly outperformed by the Estonian, Finnish, Danish, Dutch, German, and Polish groups. No other differences were statistically significant.

The analogous one-way ANOVA analyzing the performance of the 11 language groups on the active (control) sentences produced a weak but significant effect: $F(10,252) = 4.457, p < .001$. Post hoc tests (Games-Howell) indicated that two lowest-performing groups—English and Lithuanian—were both significantly outperformed by the Catalan and Hebrew groups. All significant differences were rather small in effect size, and active sentences were rather easy for most children, so even the worst performing group (English) had a mean accuracy of 89% (see Figure 1 and Appendix C). This was an inevitable consequence of the above-chance inclusionary criteria we adopted selecting children whose overall language competence is good (see the first paragraph of the Results section).

The full passive experiment also produced a significant effect of Language: $F(7,176) = 15.421, p < .001$; and a large effect of Structure: $F(1,176) = 248.826, p < .001$; as well as a significant interaction between the two: $F(7,176) = 26.673, p < .001$. Thus, the active sentences were much easier than the full passive sentences (23% difference: $M_{\text{active}} = 94.35$; $M_{\text{passive}} = 71.19$); performance accuracy differed across language groups; and the two factors were related: The magnitude and direction of cross-linguistic differences depended on the structure. This interaction was explored with a one-way ANOVA comparing the performance of the eight language groups for the full passive sentences only, which showed a significant difference: $F(7,176) = 21.164, p < .001$. This reflected an extremely low performance of Catalan, Lithuanian, and Hebrew children. A Games-Howell post hoc test indicated that Catalan children ($M = 33.65\%$) performed significantly worse than all other groups apart from Lithuanian. In fact, the average performance of the Catalan group was no better than chance. This is even more remarkable, given that the same Catalan children were the highest-scoring group on the active sentences. The Lithuanian children ($M = 48.46\%$) did significantly worse than all groups except Catalan and Hebrew. Finally, the Hebrew group ($M = 62.54\%$), while significantly outperforming the Catalan group, and being no different from the Lithuanian group, was significantly worse than the Danish, Dutch, English, German, and Polish groups. No other differences were significant.

A one-way ANOVA comparing the performance of the eight language groups on the active sentences was significant: $F(7,176) = 3.982, p < .001$. This was due to the Catalan group performing significantly better (on the Games-Howell post hoc test) than the Dutch, Lithuanian, and Polish groups. No other differences were significant. Once more, the between-group differences on the active sentences were quite small, so the groups appear quite well matched on the control (active) condition.

Another way to interpret the ANOVA results reported earlier is to examine the discrepancy between performance of the same children on the active and the passive sentences. While, on

Table 3. Mean % differences, and effect sizes of those differences (Cohen's *d*) between performance on active and passive sentences.

	Short passives experiment		Full passives experiment	
	% differences ($M_{\text{active}} - M_{\text{passive}}$)	Cohen's <i>d</i>	% differences ($M_{\text{active}} - M_{\text{passive}}$)	Cohen's <i>d</i>
Estonian	−1.28%	−0.21	—	—
Finnish	−5.01%	−0.94**	—	—
Greek (CY)	10.37%	1.17***	—	—
Catalan	12.82%	0.79**	64.10%	2.87***
Danish	−1.75%	−0.28	7.34%	0.72*
Dutch	−0.64%	−0.08	8.85%	0.71**
English	7.69%	0.62*	8.74%	0.71*
German	−1.54%	−0.30	11.38%	0.84**
Hebrew	5.77%	0.91**	33.44%	2.09***
Lithuanian	5.01%	0.36	42.31%	1.81***
Polish	1.06%	0.14	9.07%	0.74**

Note. Positive values indicate higher scores on active sentences.

average, the active sentences were easier than the passive ones, it was not always so—the direction and magnitude of the difference depended on the particular combination of experiment and language (see Figure 1, Appendix C, and Table 3).

As seen in Table 3, in the short passive experiment, the differences were usually small and inconsistent across languages. While passive sentences were significantly harder than the active ones for Greek, Catalan, English, and Hebrew children, the opposite was the case for the Finnish children. For the remaining six languages there was no significant difference. In contrast, on the full passive experiment the passive sentences were consistently harder than the active ones for all eight languages, though the magnitude of that difference varied considerably.

5.3.1. Individual differences

Table 4 reports the number of children who performed at chance, above chance, and at ceiling (without error) on the passive sentences in both experiments. As mentioned at the beginning of this section, we assume the chance level to be at 33%, assumption of random guessing between three action pictures but ignoring the picture not containing any action. On the short passive experiment, less than 4% of all participants performed at chance, while nearly half of all children obtained the maximum possible score. Thus, as indicated in the earlier ANOVA analyses, short passive sentences are usually fairly easy for 5-year-olds. This is not the case, however, with full passives, where over a quarter of all children performed at chance, and only one in five at ceiling. Cross-linguistic differences were also apparent,

Table 4. Number and percentage of children performing at chance, above chance and at ceiling (passive sentences only).

	Short passives experiment			Full passives experiment		
	At chance (7 or below)**	Above chance (8–12)	At ceiling (13)	At chance (7 or below)**	Above chance (8–12)	At ceiling (13)
Estonian	0	9 (37.5%)	15 (63.5%)	—	—	—
Finnish	0	7 (30.4%)	16 (69.6%)	—	—	—
Greek (CY)	0	21 (91.3%)	2 (8.7%)	—	—	—
Catalan	4 (16.7%)	9 (37.5%)	11 (45.8%)	18 (75.0%)	5 (20.8%)	1 (4.2%)
Danish	0	10 (45.5%)	12 (54.5%)	1 (4.5%)	12 (54.5%)	9 (40.9%)
Dutch	0	11 (45.8%)	13 (54.2%)	3 (15.0%)	15 (75.0%)	2 (10.0%)
English	2 (9.1%)	16 (72.7%)	4 (18.2%)	1 (4.5%)	13 (59.1%)	8 (36.4%)
German	0	8 (32.0%)	17 (68.0%)	3 (12.0%)	14 (56.0%)	8 (32.0%)
Hebrew	0	13 (54.2%)	11 (45.8%)	9 (39.1%)	13 (56.5%)	1 (4.3%)
Lithuanian	3 (13.0%)	13 (56.5%)	7 (30.4%)	13 (65.0%)	4 (20.0%)	3 (15.0%)
Polish	1 (3.4%)	8 (27.6%)	20 (69.0%)	1 (3.6%)	20 (71.4%)	7 (25.0%)
ALL	10 (3.8%)	125 (47.5%)	128 (48.7%)	49 (26.6%)	96 (52.2%)	39 (21.2%)

**p* > .05 on the binomial test, test proportion 25%.
 ***p* > .05 on the binomial test, test proportion 33%.

especially on the full passives: While as many as three-quarters of Catalan children, two-thirds of Lithuanian, and well over a third of Hebrew children performed at chance on the full passives, such poor performance was much rarer (15% or below) in other language groups.

5.4. *What errors do children make in the passive tasks?*

Turning to the fourth question, we investigated whether children's errors in comprehending passive constructions show a canonical (agent-verb-theme) interpretation revealed by errors of theta-role reversal. Table 5 presents information about the frequency and percentage of the four types of errors on the passive sentences in both experiments.

Overall, the theta-role reversal errors predominated both in the short passive sentences (57.8% vs. 31.3%), and in the full passive sentences (82.9% vs. 14.6%), although in Dutch and German, there were more "other errors" than the "theta-role reversal errors" with short passives; in English, Estonian, and Finnish, these two types of errors were equally frequent with short passives; and in Polish, these two types of errors were equally frequent in both experiments. "Other errors" was the second-most-frequent error category, while the neutral errors and refusal to provide an answer were rare.

6. Discussion

The present study investigated whether children understand both short and full passives by the age of 5 in 11 languages, comparing within and between the languages and analyzing error types. The study offers four major findings:

- (1) In all 11 languages, 5-year-old children showed good comprehension of the short passive, performing well above chance. Yet Catalan, Cypriot Greek, English, and Lithuanian children scored lower (mean of 82%–85%), compared to the other languages (mean of 93%–98%).
- (2) Greater language variation was observed in the comprehension of the full passive: Catalan-, Lithuanian-, and Hebrew-speaking children scored much lower (mean of 34%–63%; at chance in the case of Catalan) compared to the other languages (mean 82%–89%).
- (3) Children performed better in the short passive experiment than in the full passive experiment in Catalan, Dutch, German, Hebrew, Lithuanian, and Polish, and equally well in Danish and English.
- (4) The predominant error type involved was "theta-role reversal."

In what follows, we address these findings, discussing why full passives are often mastered later than short passives in light of the specific challenges each of the languages poses to the child in acquiring the two passive constructions. Recall that we made four predictions in Section 3, repeated here. We explore whether the cross-linguistic variations can be related to any of the following.

- (1) Word order flexibility: Languages that allow a structure where the internal argument precedes the verb and the external argument acquires the passive construction earlier than the ones that lack this flexibility (Aschermann, Gültzow & Wendt, 2004).
- (2) Uniqueness of syntactic/morphological characteristics of passives: When the passive structure of the language utilizes a unique syntactic/morphological property (e.g., special verbal suffix for the passives, special auxiliary for the passive), children speaking that language acquire the passive construction earlier than those speaking a language with ambiguous forms (uniqueness of syntactic/morphological characteristics of passives [Demuth 1990]). There are three areas that may be the cause of uniqueness:
 - (i) Morphological passives (because of the uniqueness of passive morphology) may be acquired earlier than periphrastic passives.
 - (ii) A language with a unique morphological marker of external argument may acquire the passive construction earlier.

Table 5. Number and percentage of errors (passive sentences only).

	Short passive experiment				Full passives experiment			
	Reversal N (%)	Wrong patient N (%)	Neutral N (%)	No answr N (%)	Reversal N (%)	Wrong patient N (%)	Neutral N (%)	No answr N (%)
Estonian	6 (54.5%)	5 (45.5%)	0	0	—	—	—	—
Finnish	4 (50.0%)	3 (37.5%)	1 (12.5%)	0	—	—	—	—
Greek (CY)	33 (67.3%)	12 (24.5%)	4 (8.2%)	0	—	—	—	—
Catalan	37 (77.1%)	6 (12.5%)	2 (4.2%)	3 (6.3%)	205 (99.0%)	2 (1.0%)	0	0
Danish	10 (71.4%)	2 (14.3%)	2 (14.3%)	0	20 (64.5%)	9 (29.0%)	2 (6.5%)	0
Dutch	7 (38.9%)	10 (55.6%)	1 (5.6%)	0	29 (63.0%)	16 (34.8%)	1 (2.2%)	0
English	22 (42.3%)	22 (42.3%)	8 (15.4%)	0	26 (70.3%)	9 (24.3%)	2 (5.4%)	0
German	2 (25.0%)	6 (75.0%)	0	0	45 (83.3%)	8 (14.8%)	1 (1.9%)	0
Hebrew	13 (56.5%)	3 (13.0%)	7 (30.4%)	0	91 (81.3%)	12 (10.7%)	9 (8.0%)	0
Lithuanian	27 (60.0%)	16 (35.6%)	2 (4.4%)	0	119 (88.8%)	14 (10.4%)	1 (0.7%)	0
Polish	9 (50.0%)	7 (38.9%)	2 (11.1%)	0	31 (50.0%)	30 (48.3%)	1 (1.6%)	0
ALL	170 (57.8%)	92 (31.3%)	29 (9.9%)	3 (1.0%)	566 (82.9%)	100 (14.6%)	17 (2.5%)	0

- (iii) Passives may be acquired earlier in a language with a unique auxiliary for passives (Catalan) than in a language with an auxiliary verb used in more than one construction (English).

6.1. Why are full passives acquired later than short passives?

Children were less successful on full passives than on short passives in seven out of the eight languages under study. Among these languages, the difference was statistically significant in six (Catalan, Dutch, German, Hebrew, Lithuanian, and Polish). Why are full passives harder than short passives for 5-year-olds?

One possibility is that children understand the short passives as adjectival passives. Previous studies on production show that children produce adjectival passives earlier than verbal passives (Israel, Johnson & Brooks 2001). Let us hypothesize that the absence of the external argument phrase allowed the children to analyze short passive sentences as adjectival passives or unaccusatives (in Hebrew), although this is not possible for adults.¹⁷ We predict, then, that children perform better with short passives for the same reason they perform better with the adjectival passives and produce them earlier in previous studies. Adopting the nonadult, adjectival structure leads a child to choose the target picture, as long as the child assigns the internal patient/theme role to the subject.

In most languages investigated in this article, adjectival and verbal passives are morphologically distinct (except in Hebrew in present tense and Finnish). In English, adjectival and verbal passives may take the same form as shown in (4a). The example in (4a) may describe either a state (a covered girl) or an event (the girl being covered), whereas (4b) can only be used for describing an event.

- (4) a. The girl is covered
b. The girl is being covered (by the boy)

In other languages, disambiguation of verbal and adjectival passive is achieved by the use of a different auxiliary, as exhibited by examples in (5a vs. 5b) from Danish (putting aside the morphological passive).

(5) a. Adjectival:	Pigen	er	puttet	(af mor) (complete)
	girl	be.PRES.3.SG	cover.PTCP	(by mother)
	‘The girl is covered (by mother)’			
b. Verbal:	Pigen	bliver	puttet	(af mor) (incomplete)
	girl	become.PRES	cover.PTCP	(by mother)
	‘The girl is being covered (by mother)’			

With full passives, however, the subject and the external argument (*by-phrase*) introduce two protagonists overtly, each of whom play a role in the ongoing activity. What do we predict a child who has not acquired the passive structure would do? There are two possibilities: (1) ignore the preposition and interpret the construction as its active counterpart; or (2) understand the preposition as not introducing the external argument, but as a locative preposition.

The first possibility would predict that the child would map NP-V-NP onto S-V-O, ignoring the passive morphology, and choose the picture in which the theta roles of the relevant protagonists are reversed. The second possibility might yield, in our design, a selection of the picture depicting the wrong agent in those languages in which it is semantically plausible (e.g., English, Hebrew) because a third protagonist in the picture, “the wrong agent,” is always nearby. This is plausible since the external argument in the full passive construction is a prepositional phrase in all the studied

¹⁷We thank an anonymous reviewer for bringing this possibility to our attention.

languages, except for Lithuanian, which uses Genitive case. These prepositional phrases (except in Hebrew¹⁸), therefore, are ambiguous between external argument phrase (as in *by-phrase*) and locative phrase. There were predominantly theta-role reversal errors and not very many wrong-agent errors produced, however, and hence, this latter possibility is a less likely explanation than the first possibility. That is, when the adjectival passive interpretation becomes impossible in the presence of the external argument, children who have not acquired the verbal passive yet assign the external argument theta-role to the first NP of the sentence, assigning the theme role to the second NP that is part of the PP, ignoring that there is a preposition and passive morphology.

6.2. Cross-linguistic differences in the acquisition of short passives

In both the short and full passive experiments, we observed cross-linguistic variation, even with short passives, where overall, 5-year-old children performed well. Based on our results we could separate the languages into two groups.

- (1) Children acquiring Danish, Dutch, Estonian, Finnish, German, Hebrew, and Polish responded at a near ceiling level with a score of 93%–98%.
- (2) Children acquiring Catalan, Cypriot Greek, Lithuanian, and English performed with around 80% success, which is still well above chance.

In the short passive experiment, an item-by-item analysis showed sizable differences in item difficulty (See Appendix D). However, the item effects were language specific; the easiest and hardest items differed across languages. A subject-by-subject analysis further showed that error patterns were predominantly produced by a small subset of children, while the remaining ones scored near or at ceiling. For example, of the 263 children tested, only 10 children showed a guessing pattern (4 Catalan, 2 English, 3 Lithuanian, and 1 Polish; see Table 4). Removing these 10 outliers has a sizable impact on children's performance accuracy in passive sentences in two languages only: Catalan (changed from 84.6 to 91.58) and Lithuanian (changed from 82.4 to 89) (see Table 2), and the differences between active and passive conditions become nonsignificant in Catalan. Yet, there remains a significant difference between active and short passive in Cypriot Greek, English, and Hebrew.

It thus appears that even in those languages that have scored lower than the others, the majority of the children had already mastered the mechanism and structure necessary to comprehend (short) passives. The performance of the 10 outlier children could not be attributed to a younger age and thus might suggest that these children have a language delay; however, it is beyond the scope of the present study to justify this because we do not have their language profile.

What could be the cause of the delay in Cypriot Greek, English, and Hebrew? In the case of Cypriot Greek, it may be the ambiguity and the limited availability of the passive form as an input. There is a rather intensive debate whether it even exists for the full range of verbs used in this particular study. The form that is used in Cypriot Greek for the passive voice also has the simple reflexive reading, the simple reciprocal reading, the causative reflexive reading, and other functions.¹⁹ Thus, the difficulty encountered by the Cypriot Greek-speaking children is far from surprising, given the ambiguity and the restricted use of the studied morpheme to mark argument reduction in the passive voice.

The ambiguity in form can account for the difficulty with the English short passive as well, as the participial form of the majority of the verbs tested is the same as the active past tense. Likewise in Hebrew, one of the patterns used marks ambiguously the passive and the unaccusative. Could the impact of ambiguity of form be extended to account for the results from the full passive experiment? We address this question in the following section.

¹⁸The Hebrew preposition, though being unique to the passive, is phonologically similar to (and historically derived from) the locative preposition meaning 'next to.'

¹⁹Catalan also has a passive form that can be interpreted as reflexive, but this form of passive is not the one chosen for Catalan in the present study.

6.3. Cross-linguistic differences in the acquisition of full passives

The full passive experiment resulted in more dramatic cross-linguistic variation. Even though the full passives were harder than the short passives, the level of success was still high (above 80% on average) in five languages (Danish, Dutch, English, German, and Polish). Moreover, in all five languages, only one or two children were at chance or below (with none in Danish), and less than half were at ceiling, with the majority of children showing an above-chance (but not ceiling) performance (see Table 4). This suggests that the difference in success rate between short and full passive is not an artifact of unusual performance of merely a handful of children. Rather, it seems to depict a picture where children speaking these languages have mostly acquired the grammatical tools necessary for comprehending the passive construction, although they do still make occasional mistakes, but no single explanation lends itself to these errors.

An error analysis of individual items, which was not reported in the results section, indicated that in the full passive condition, two items (*hug* and *kiss*) were the source of many reversal errors. This may be because these verbs are more reciprocal in nature. Two other items (*cover* and *put makeup/face-paint*) were the source of the majority of the wrong-agent errors across all five languages. No single explanation lends itself to these wrong-agent errors. It is not likely, however, that these item effects can be attributed to difficulties children had with these verbs because similar problems were not found for the short passives. The general pattern of responses in these languages suggested that within each language children were better on some items than others, showing possible evidence for item-based learning of the full passive, with some verbs being as high as 100% success (e.g., *dirty* in Dutch), and others as low as only 50% success (e.g., *make up* in English or *cover* in Dutch).

Unlike the success in these five languages, the levels of success in Hebrew and Lithuanian were around 60% and 45% respectively, and in Catalan, children responded correctly only a third of the time. What is the cause of these cross-linguistic differences?

To find what causes excessive difficulties in Catalan, Lithuanian, and Hebrew, but not in the other languages that we have tested, proved rather difficult, as they do not form a natural class easily. Properties of the external argument phrase, properties of morphological markers, and the effects of the specificity (uniqueness or ambiguity in form-function relations) of the passive structure were mentioned earlier as possible sources of cross-linguistic variability. None of these linguistic variables can help group these three languages together, leaving out the other languages, as can be seen in Table 6.

- (1) Word order flexibility: Some of the languages that performed very well in both short and full passives are V2 languages (Danish, Dutch, and German) and hence allow more word-order flexibility than some other languages. Catalan, however, allows Object-Verb-Subject word order, even though it is syntactically and phonologically very marked, and Hebrew has a flexible word order.
- (2) Properties of morphological markers: Catalan has a periphrastic passive, but so do the majority of the languages tested where over 80% success rate was found, while the other two (Hebrew and Lithuanian) use a morphological passive. Yet, the use of a morphological passive alone could not explain the difficulty because Polish also has the morphological passive.

Table 6. Comparison of the eight languages from the full passive experiment for mean success rate and language characteristics (Languages are ordered by mean success rate in ascending order).

	Mean success (Full passive)	Word order	Periphrastic passive	Morphological passive	Other similar construction
Catalan	33.65	some flexibility (allow OVS)	yes	yes	reflexive passive
Lithuanian	48.46	relatively rigid	no	yes	impersonal
Hebrew	62.54	flexible	no	yes	resultative
Dutch	82.31	flexible (V2)	yes	no	impersonal
Polish	82.97	flexible	no	yes	impersonal
German	83.38	flexible (V2)	yes	no	impersonal
English	87.06	rigid	yes	no	no
Danish	89.16	flexible (V2)	yes	yes	impersonal

- (3) Properties of the external argument: There is nothing common to the properties of the external arguments of Hebrew, Lithuanian, and Catalan. While Hebrew has a unique preposition, and Lithuanian is the only one of the studied languages that uses the genitive case, Catalan makes use of a prepositional phrase that could be misinterpreted as a locative, like all other languages in which this did not cause a problem.
- (4) Ambiguity of form/uniqueness of verbal passive: Catalan has a clear distinction between the verbal passive and the adjectival forms (different auxiliary); so does Lithuanian, whose adjectival passives are always past tense, while the current study tested the passive in the present tense, which is rarely in adjectival passive in Lithuanian. The opposite case is found, however, in Hebrew, in which adjectival passives are always present tense, as tested, and still children did not seem to use these adjectival forms in bootstrapping the structure of the full passive and found it more difficult than in other languages.

Our search for a common formal language factor or set of factors that could contribute to an explanation of why full passive is later acquired in some languages did not provide us with a unified explanation for the difficulty found in these three languages. It is possible that some pragmatic or input factors play a role, but these could not be addressed in detail in the present study. Thus, the cross-linguistic differences obtained in full passive experiment require further investigation.

In sum, the languages studied here present a range of children's language abilities across languages. While in the majority of the languages we studied, 5-year-olds exhibited high competence in the comprehension of the full passive, in some other languages this is still a long-sought dream. Languages in which the short passive is mastered by the age of 5 are more likely to support the full passive at this age as well. In languages in which children struggle with the short passive, they are more prone to struggle with the full passive to the degree of having no knowledge of this structure at the age of 5. This interpretation, however, could not be directly confirmed in the present study, as short and full passives experiments were conducted on independent samples. No single explanation could explain the cross-linguistic variability. Yet, this variability, by itself, is a challenge for a maturation-type hypothesis, requiring further investigation.

7. Conclusion

The present study addressed four questions:

- (1) Do children understand both short and full passives by the age of 5?
- (2) Are full passives harder to learn than short ones?
- (3) Do we observe language variation regarding the acquisition of passives?
- (4) What is the nature of children's errors?

Our overall finding is that most 5-year-old children perform very well with the short passive, with a bigger language variation with the full passive, which, in most languages studied here, was more difficult than the short one. We theorized that those children who perform well with the full passive have acquired the verbal passive construction, and their occasional mistakes stem from difficulties with particular items, suggesting an item-based acquisition of the passive. Those children who do not perform well with the full passive, on the other hand, have not acquired the verbal passive yet. They may rely on the adjectival reading for the short passive (Embick 2004; Hirsch and Wexler 2006)²⁰

²⁰One reviewer suggested that the exclusive use of actional verbs made this possibility more likely. First, in many languages, adjectival or resultative passives are easier with actional verbs. While it is true that this is not the case for all verbs that can be seen in our results, there is an overarching generalization that should not be ignored. Second, in numerous languages, there are additional forms of the passive that seem to be consistent in their noncanonical behavior. The English *get*-passive, as well as its counterparts in German, French, Dutch, and Swedish (and perhaps adversative passives in East Asian languages and their counterparts in a variety of Austronesian languages) are each restricted to highly actional, or affected, contexts and participles. Thus, it is conceivable that actionality and the use of the present tense could serve as powerful cues to children of an alternative structure for short passives. In full passives, the presence of the external argument phrase may make such an alternative less feasible. This needs to be tested by complementary experiments testing the same structure in the past tense and with nonactional verbs.

and more on the word order in the full passive. Therefore, they identify the external argument with the first NP and the internal argument with the second NP, ignoring the preposition (or genitive case marker) that indicates that the second noun phrase is the external one.

It was not possible to identify some morphosyntactic characteristics that could explain why the passive is more difficult in some languages than others. Our findings suggest that by the age of 5, the ambiguity of the past participle or the preposition in the external argument phrase is not a major source of difficulty. If it were, we would expect more errors among children speaking languages that were more successful with the full passive.

Finally, our finding suggests that while the external argument phrase on its own does not seem to be a major source of difficulty, as is evident by the low percentage of wrong-agent errors in the full passive, it helps us identify whether a child has mastered the syntactic mechanism required to produce the passive. With the full passive, children who have not mastered the relevant syntactic knowledge yet opt for the canonical word order interpretation, whereas in those languages in which children have mastered the grammatical mechanism that is involved in passive, only 8%–14% of the responses are reversal errors, suggesting a failure in applying the relevant mechanism.²¹

To conclude, the varied level of success found shows that children speaking different languages seem to acquire the mechanism required to comprehend (hence, probably construct) passive structures at varying pace. This age group still presents a variation for the short passive and an even greater variation for the full passive. What can be argued, based on the present findings, is that given the relevant linguistic input (e.g., flexibility in word order and experience with argument reduction), children at the age of 5 are capable of acquiring both the short passive and the full passive. Variation, however, must stem from the specific characteristics of each language, and good mastery of passives by the age of 5 is not a universal, cross-linguistically valid milestone in typical language acquisition. Therefore, difficulties comprehending passives (short or full) could be used for identifying SLI at the age of 5 but only in the languages we have now documented that typically developing children this age show full mastery.

Limitations of the study need to be acknowledged. Our study adopted a between-subject design in comparing languages (something unavoidable with monolingual samples) but also in comparing short and full passives. This inevitably confounds the acquisition of linguistic structures (our focus here) with language abilities of our participants. While children's performance on the active (control) condition indicates that the participants were relatively well matched in terms of their language ability, the match was, nevertheless, not perfect. The future studies of the acquisition of passives construction may control for this problem by adopting a between-subject design.

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²¹The present study tested only actional verbs that take an agent and as such could not test Fox & Grodzinsky's (1998) proposal for difficulties with theta-role transmission in nonactional passives, which is one of the mechanisms that may be involved in constructing the passive construction.

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Appendix A

Two examples of slides used in the experiment. The top slide (picture set) corresponds to the passive sentence *Grandma is fed* in the short passive condition and to the passive sentence *The little girl is fed by Grandma* in the full passive condition. The bottom slide corresponds to the passive sentence *Dad is covered* in the short passive condition and to the passive sentence *The little boy is covered by Dad* in the full passive condition.

Appendix B

Verbs used in the short and full passive experiments across languages present in the study (alphabetical order).

Languages		Catalan	Cypriot Greek	Danish	Dutch	English	Estonian	Finnish	German	Hebrew	Lithuanian	Polish	Polish	Words Analyzed in the Current Study
Verbs\Version														
1	<i>chase</i>	+	+	+	+		+	+			+	+		
2	<i>examine</i>	+	+	+		+		+	+	+	+	+		+
3	<i>comb</i>	+	+	+	+	+	+	+	+	+	+	+		+
4	<i>dirty</i>													
5	<i>draw</i>	+	+	+	+	+	+	+	+	+	+	+		+
6	<i>feed</i>	+	+	+	+	+	+	+	+	+	+	+		+
7	<i>kiss</i>	+		+	+	+	+	+	+	+	+	+		+
8	<i>push</i>		+	+		+	+	+	+	+	+	+		+
9	<i>scratch</i>	+	+	+	+	+	+	+	+	+	+	+		+
10	<i>stroke</i>	+			+	+	+	+	+	+	+	+		+
11	<i>wash</i>	+	+	+	+	+	+	+	+	+	+	+		+
12	<i>bite</i>		+	+	+	+	+	+	+	+	+	+		+
13	<i>carry</i>	+	+	+	+	+	+	+	+	+	+	+		+
14	<i>cover</i>	+	+	+	+	+	+	+	+	+	+	+		+
15	<i>hit</i>	+			+	+	+	+	+	+	+	+		+
16	<i>hug</i>		+	+		+	+	+	+	+	+	+		+
17	<i>make up</i>	+	+	+	+	+	+	+	+	+	+	+		+
18	<i>photograph</i>													
19	<i>pull</i>	+	+	+		+	+	+	+	+	+	+		
20	<i>shave</i>	+		+	+	+	+	+	+	+	+	+		
21	<i>tickle</i>	+	+	+	+	+	+	+	+	+	+	+		+
22	<i>wipe/dry</i>	+	+	+	+	+	+	+	+	+	+	+		+

+ Shows that the verb was used in a given language.

Appendix C

Performance accuracy (% correct out of 13) on both experiments.

		Short passives experiment				Full passives experiment			
		M	Mdn	SD	Min–Max	M	Mdn	SD	Min–Max
Estonian	ACT	95.19	100	6.73	76.92–100	–	–	–	–
	PASS	96.47	100	5.06	84.62–100	–	–	–	–
Finnish	ACT	92.31	92.31	6.14	76.92–100	–	–	–	–
	PASS	97.32	100	4.41	84.62–100	–	–	–	–
Greek (CY)	ACT	93.98	92.31	6.54	76.92–100	–	–	–	–
	PASS	83.61	84.62	10.71	61.54–100	–	–	–	–
Catalan	ACT	97.44	100	4.90	84.62–100	97.76	100	4.23	84.62–100
	PASS	84.62	92.31	22.46	30.77–100	33.65	23.08	31.33	0–100
Danish	ACT	93.36	92.31	6.41	76.92–100	96.50	100	4.58	84.62–100
	PASS	95.10	100	6.07	84.62–100	89.16	92.31	13.57	53.85–100
Dutch	ACT	93.59	96.15	8.07	76.92–100	91.15	92.31	8.00	76.92–100
	PASS	94.23	100	7.61	76.92–100	82.31	88.46	15.61	46.15–100
English	ACT	89.51	92.31	9.05	76.92–100	95.80	100	5.68	76.92–100
	PASS	81.82	84.62	14.93	53.85–100	87.06	92.31	16.51	30.77–100
German	ACT	96.00	100	6.33	76.92–100	94.77	100	6.56	76.92–100
	PASS	97.54	100	3.66	92.31–100	83.38	92.31	18.00	38.46–100
Hebrew	ACT	98.40	100	3.19	92.31–100	95.99	100	4.56	84.62–100
	PASS	92.63	92.31	8.33	69.23–100	62.54	61.54	22.16	23.08–100
Lithuanian	ACT	89.97	92.31	8.18	76.92–100	90.77	92.31	6.88	76.92–100
	PASS	84.95	92.31	18.04	38.46–100	48.46	46.15	32.26	7.69–100
Polish	ACT	96.29	100	4.87	84.62–100	92.03	92.31	8.24	76.92–100
	PASS	95.23	100	9.95	53.85–100	82.97	84.62	15.29	38.46–100

Mdn = median; ACT = the active condition; PASS = the passive condition.

Appendix D: Item analysis

The results reported are based on a test comprising a mere 13 lexical items. It is therefore important to check whether the observed patterns are truly generalizable and not artifacts of atypical performance on a handful of items.²² To address this possibility, the average performance accuracy on each individual test item was analyzed separately for each language group (see Appendix D for figures for each language). The accompanying *t*-test and Cohen's *d* analyses explore difference between mean scores for 13 active and 13 passive sentences. As such, they are a by-item equivalent of the analyses reported in Table 3.

The overall pattern of the by-item analyses broadly replicates the results reported earlier. In the short passives experiment, the difference between active and passive sentences tend to be small; they reach statistical significance ($p < .05$) for Greek, Catalan, and Hebrew only and approach statistical significance ($p < .10$) for Finnish, English, and Lithuanian (in the case of Finnish, this reflects better performance on the *passive* sentences). In contrast, the differences between active and passive sentences tend to be larger in the full passive experiment; all are statistically significant.

However, closer examination of the by-item analysis within each language indicates that, in some languages, significant overall differences between active and passive sentences camouflage considerable variability between items—some items are much harder than others. This is most apparent in the case of Greek and Catalan (on the short passives experiment) as well as Dutch and Polish (on the full passives experiment). Thus, the choice of experimental items turns out to be nontrivial, though what constitutes an atypical item (an outlier) appears to depend entirely on the language. A by-item analysis of error types was also performed but is not reported here, as it did not change the overall interpretation of the results.

By-item analysis of % accuracy is shown:

²²We are grateful to one of the reviewers for this suggestion.

a) Estonian—short passives experiment
 $d = -0.36$

b) Finnish—short passives experiment
 $d = -0.75$

c) Greek (CY)—short passives experiment
 $d = 0.80^*$

d) Catalan—short passives experiment
 $d = 1.80^{**}$

e) Catalan—full passives experiment
 $d = 7.46^{***}$

f) Danish—short passives experiment
 $d = -0.28$

g) Danish—full passives experiment
 $d = 0.99^{*}$

h) Dutch—short passives experiment
 $d = -0.10$

i) Dutch—full passives experiment
 $d = 0.97^{*}$

j) English—short passives experiment
 $d = 0.79$

k) English—full passives experiment
 $d = 1.11^{**}$

l) German—short passives experiment
 $d = -0.34$

m) German—full passives experiment
 $d = 1.96^{***}$

n) Hebrew—short passives experiment
 $d = 1.05^{*}$

o) Hebrew—full passives experiment
 $d = 3.06^{***}$

p) Lithuanian—short passives experiment
 $d = 0.63$

r) Lithuanian—full passives experiment
 $d = 5.52^{***}$

h) Polish—short passives experiment
 $d = 0.21$

i) Polish—full passives experiment
 $d = 0.96^{*}$

Solid line = active condition; dotted line = passive condition.
*** $p < .001$; ** $p < .01$; * $p < .05$; on the paired-samples t -test.
 d = Cohen's d measure of effect size of the difference between the active and passive condition.