

# The Ditransitive Learnability Problem: First language acquisition of active and passive ditransitive constructions in Dutch and English

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# 1. Introduction

## 1.1. Learnability

The study of child language has often been linked to the study of the universal properties of natural languages. Child language studies can be aimed at simply describing acquisition patterns, that is, finding out *what* children of different ages do or do not say or understand. More importantly for present-day linguistics, however, such studies can address the ‘learnability’ of language, that is, the issue of *how* natural languages are acquired under normal circumstances. Can an entire language be acquired by listening to linguistic input alone, or are specific skills required, innate and universally available? To answer such an extensive question, language acquisition studies should not focus on a single language at a time. Rather, crosslinguistic studies, which compare acquisition patterns in languages with specific differences and similarities, can be particularly insightful. For instance, if natural languages cannot be acquired based solely on input, crosslinguistic studies can tell us what our innate skills must look like in order to enable us to acquire any possible natural language.

Over the last decades, researchers have found many examples of ‘learnability problems’ in different languages, that is, properties of a language that children seem to know more about than they could reasonably have learned from the input. One reason for this is that the amount of language input children receive is finite, whereas all natural languages have infinite possibilities, making it, by definition, impossible for children to hear all the words of the language they are learning in all the possible sentences that this language allows. At the same time, language input can be overwhelming for children as well, containing too much information about meaning and structure to process all at once. Furthermore, the input can be very messy (e.g., full of unfinished sentences) and unstructured, as parents are not teachers who provide their children with organized vocabulary lists and grammar examples. As a result, from the typical input that the average developing child receives, many different hypotheses about language rules could be formed. For example, if a child hears *Lisa is happy to come along* and *Is Lisa happy to come along?* they could, in principle, deduce a question formation rule where the first verb of the sentence must be moved to the beginning of the sentence. However, no child will ever utter *\*Is the girl who wearing a dress is happy?* as the question form of *The girl who is wearing a dress is happy*. In other words, despite the problematic input, there are mistakes that no child ever makes during their language development.<sup>1</sup> Rather, children learning the same language, and to some extent even children learning different languages, largely follow the same patterns in their language acquisition process, producing similar types of words and structures in the same chronological order and roughly at the same ages, without receiving any explicit instructions.

This argumentation formed an important basis for Chomsky’s (1981, 1986) hypothesis that all humans are born with innate knowledge of the structure of language: universal principles, which hold for all natural languages, and parameters, which capture the differences between specific languages (or types of languages). Although the exact nature of Universal Grammar may have changed in more recent work, the idea of an innate language system has remained and is supported by many linguists. Still, even if we do not assume that children are born with a full set of linguistic

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<sup>1</sup> For further discussion of this poverty of stimulus argument, see Chomsky (1980).

principles and parameters, it cannot be denied that there are important similarities between the languages of the world. Such similarities have very likely emerged from the way humans categorize the world, which strongly suggests that children must have some knowledge or instinct about what to do with the input they receive, causing some mistakes to be never made. This can be as simple as the distinction that newborn infants make between language input and non-linguistic human sounds (Vouloumanos & Werker, 2007), or as fundamental as the difference between nouns and verbs, which appears to exist in all languages and may be a result of humans automatically distinguishing objects from actions. This relation between the meaning and the function of a word is something that children appear to be aware of from early on (Pinker, 1984; Gleitman, 1990). Finally, returning to the example of question formation, no languages appear to have structure-insensitive rules (such as movement of the first verb in a sentence to form a question) and children never form those kinds of rules in their language acquisition process.

However, before postulating innate linguistic knowledge concerning a specific linguistic phenomenon, we must be absolutely certain that it is not possible to acquire this phenomenon based on input. Crosslinguistic studies, which compare multiple languages, can be helpful in examining the role of input. For instance, if language A has one article and language B has two, will a child learning language B need more input and therefore, on average, more time to fully acquire the article system than a child learning language A? If so, how much more? And what can be predicted for a child learning a language C with three articles? Can we say that one language is more 'learnable' than another?

This thesis focuses on a specific learnability problem, caused by the properties of several Dutch and English constructions formed with ditransitive verbs, that is, verbs with three arguments. The remainder of this introduction is dedicated to an explanation of what ditransitive verbs are and why their acquisition is interesting in light of the learnability problem. The underlying question is not whether language has an innate basis, but how children's (innate or not) knowledge and abilities work: What exact mechanisms do children need to acquire adult-like knowledge of language?

## 1.2. The learnability problem of ditransitive verbs

Verbs can be categorized by the number of arguments they take, that is, in terms of verb valency. The most frequently occurring type of verb, the monotransitive (or transitive) verb, takes two arguments, which generally manifest themselves as subject and object (see 1). Typically, these arguments have the respective roles of agent and theme (see 1), but other possibilities include, respectively, cause and theme, experiencer and theme, and theme and experiencer. Besides monotransitive verbs, there are intransitive verbs, which take one argument (see 2), and ditransitive verbs, which take three arguments (see 3). Intransitive verbs can be further divided into unergative verbs and unaccusative verbs. The argument of an unergative verb will typically be an agentive subject (see 2a), whereas unaccusative verbs typically take theme subjects (see 2b). Finally, ditransitive verbs take a subject, which is typically an agent, and two objects: the (direct) object that we generally find with monotransitive verbs, which is typically a theme, and an indirect object, which often has a goal role (see 3).

- |        |                |          |                        |                             |                |
|--------|----------------|----------|------------------------|-----------------------------|----------------|
| (1)    | John           | carried  | a book.                | [monotransitive]            |                |
|        | <i>subject</i> |          | <i>object</i>          |                             |                |
|        | <i>agent</i>   |          | <i>theme</i>           |                             |                |
| (2) a. | Mary           | danced.  |                        | [unergative intransitive]   |                |
|        | <i>subject</i> |          |                        |                             |                |
|        | <i>agent</i>   |          |                        |                             |                |
| b.     | John           | arrived. |                        | [unaccusative intransitive] |                |
|        | <i>subject</i> |          |                        |                             |                |
|        | <i>theme</i>   |          |                        |                             |                |
| (3)    | Mary           | gave     | John                   | a book.                     | [ditransitive] |
|        | <i>subject</i> |          | <i>indirect object</i> | <i>direct object</i>        |                |
|        | <i>agent</i>   |          | <i>goal</i>            | <i>theme</i>                |                |

*Give*, as used in example (3), is the most typical example of a ditransitive verb. Together with other verbs of giving, it forms the subcategory of transferal ditransitive verbs, a subcategory that includes verbs of non-literal transfer or ‘mental transfer’, such as *show* or *tell*, as well (Malchukov, Haspelmath & Comrie, 2010). The indirect object of a transferal verb can often be labeled as a recipient rather than a goal. Other subcategories include benefactive verbs and attributive verbs. Attributive ditransitive verbs express a property or attribute of the indirect object, as in *He named the dog Bobby*. Benefactive verbs take a beneficiary indirect object instead of the recipient indirect object that we find in transferal verbs, but there is some overlap between transferal and benefactive verbs, as, in some cases, a verb appears to be in both categories. For instance, in a sentence like *John brought Mary a coffee*, Mary could be both a beneficiary and a recipient (Malchukov, Haspelmath & Comrie, 2010). The focus of this thesis is on transferal verbs. Not only does this subcategory contain the most common examples of ditransitive verbs, but it is also best comparable between Dutch and English, as will be further explained below.

The acquisition of ditransitive verbs is interesting for several reasons. First, a case study by Tomasello (1992) showed that English-speaking children produce their first intransitive verbs before their first monotransitive verbs and their first monotransitive verbs before their first ditransitive verbs, suggesting an effect of verb valency on age of acquisition. As monotransitive verbs are more frequent than both intransitive and ditransitive verbs, the effect of verb valency on age of acquisition appears to be stronger than the effect of frequency (Tomasello, 1992; Mukherjee, 2005). In addition to language production, the more complex argument structure of ditransitive verbs has consequences for children’s language comprehension as well: compared to monotransitive sentences, there is an additional argument in ditransitive sentences that needs to be interpreted. For example, in (1), John is the only possible agent, as real-world knowledge tells us that a book cannot carry anything. In (3), however, both John and Mary could, in principle, be either agent or goal. A child encountering a sentence like (3), then, can depend less on real-world knowledge to determine who plays which role than a child encountering a sentence like (1) or (2).<sup>2</sup> More importantly,

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<sup>2</sup> In a sentence like *John hit Bill*, there are two entities who could, based on real-world knowledge, play the agent role, role, which might cause confusion as well, for instance in passive sentences. Note that there are also ditransitive sentences without animacy differences.

ditransitive verbs, but not monotransitive or intransitive verbs, show behavior that poses a learnability problem: the phenomenon of dative alternation.

In many languages, including English (see 4a, 5a) and Dutch (see 4b, 5b), ditransitive verbs can be optionally used in two active constructions with highly similar, if not identical, meanings: the prepositional dative (see 4) and the double object construction (see 5). In prepositional dative constructions, the theme precedes the goal, which is introduced by the preposition *to* in English, or *aan* 'to' in Dutch.<sup>3</sup> In double object constructions, the goal precedes the theme and does not come with a preposition.

- (4) a. Mary gave a book to John. [prepositional dative construction]  
b. Marie gaf een boek aan Jan.  
Mary gave a book to John  
'Mary gave a book to John.'
- (5) a. Mary gave John a book. [double object construction]  
b. Marie gaf Jan een boek.  
Mary gave John a book  
'Mary gave John a book.'

Besides transferal verbs (see 4-5), English also allows benefactive verbs to alternate (see 6), whereas Dutch does not (see 7).<sup>4</sup>

- (6) a. I baked her a cake.  
b. I baked a cake for her.
- (7) a. \*Ik bakte haar een taart.  
I baked her a cake  
'I baked her a cake.'  
b. Ik bakte een taart voor haar.  
I baked a cake for her  
'I baked a cake for her.'

Although the data in (4-5) show that Dutch and English allow dative alternation with transferal verbs, in both languages there are also transferal verbs that do not alternate. The examples below show several kinds of exceptions in English. Some verbs can only be used in prepositional dative constructions (see 8), or, less commonly, only in double object constructions (see 9). The latter situation often occurs with idiomatic expressions (see 10).<sup>5</sup>

- (8) a. Susan donated some money to the church.  
b. \* Susan donated the church some money.

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<sup>3</sup> In benefactive prepositional dative constructions, the preposition *for* is used (*voor* 'for' in Dutch).

<sup>4</sup> In some varieties of Dutch, benefactive double object constructions are allowed (Colleman, 2002).

<sup>5</sup> Because most transferal verbs are allowed in the prepositional dative, in this thesis, the question of whether a verb alternates will often be simplified into the question of whether it can occur in the double object construction.

- (9) a. \* Harry denied a cookie to Mary.
- b. Harry denied Mary a cookie.
- (10) a. \* The problem gave a headache to George.
- b. The problem gave George a headache.

Examples (11) and (12), taken from Broekhuis, Corver and Vos (2017), show similar exceptions in Dutch. In (11), we see a verb that can only occur in the prepositional dative. In (11), the verb *geven* 'give' is used as a light verb and is only acceptable in the double object construction.

- (11) a. Jan schreef het falen van het plan aan Peter toe.  
       Jan attributed the failure of the plan to Peter to(particle)  
       'John attributed the failure of the plan to Peter.'
- b. ?? Jan schreef Peter het falen van het plan toe.  
       Jan attributed Peter the failure of the plan to(particle)  
       'John attributed the failure of the plan to Peter.'
- (12) a. Marie gaf Peter een kus/trap.  
       Mary gave Peter a kiss/kick  
       'Mary kissed/kicked Peter.'
- b. ?? Marie gaf een kus/trap aan Peter.  
       Mary gave a kick/kick to Peter  
       'Mary kissed/kicked Peter.'

The learnability problem of dative alternation is caused by a combination of two factors: the optionality of dative alternation and the existence of exceptions like (8-12). Because most but not all verbs alternate, and because context does not determine which of the two constructions should be used, if a child has never heard a particular verb in the double object construction, it seems impossible for the child to find out if that verb cannot be used in the double object construction or if it is a coincidence that no one has uttered it around the child. Still, all children eventually learn which verbs alternate and which do not. As there are languages without dative alternation (see Levin, 2008) and, moreover, in languages with dative alternation, different verbs may alternate, as was already shown for Dutch and English (see 6-7), establishing what this innate knowledge would look like is not easily done. More importantly, assuming that innate linguistic knowledge exists is not necessarily the best solution to this problem. Instead, to come to a solution to the dative alternation learnability problem, the question that must be answered first is whether the verbs that alternate show any regularities (e.g., in form or meaning) and, if so, whether children are sensitive to these regularities and use them to form rules for dative alternation. If such rules are in place, children can 'predict' which verbs alternate, even if they have not heard those specific verbs in all possible constructions, thus solving the learnability problem of dative alternation. Children's sensitivity to form and/or meaning regularities and their ability to form rules could, theoretically, be aided by innate intuitions, for example with respect to which factors can play a role in language rules, but this is an issue beyond the scope of this thesis.

The acquisition of ditransitive verbs is clearly not the only research topic concerning children's abilities to form rules. However, whereas parts of this topic have been studied extensively, there are still major gaps in our knowledge. Specifically, English-speaking children's acquisition of



dative alternation has often been addressed, but little is known about children speaking other languages, such as Dutch. Furthermore, there is a closely related phenomenon that we know virtually nothing about, namely the acquisition of passive dative alternation by Dutch and English-speaking children. To start with English, besides the two active alternating constructions, English has two possible passive constructions: the direct object passive (see 13) and the indirect object passive (see 14). These passives raise the same question as active dative alternation: Which verbs may occur in which of these constructions and how do children learn this? However, the learnability of this passive dative alternation must be addressed separately from active dative alternation, as there is reason to believe that the two phenomena are not acquired in identical ways, which will be further explained in section 3.

- |      |                           |                           |
|------|---------------------------|---------------------------|
| (13) | A book was given to John. | [direct object passive]   |
| (14) | John was given a book.    | [indirect object passive] |

Moreover, there are important differences between the constructions in (13-14) and Dutch ditransitive passives. Comparing the acquisition patterns of both active and passive ditransitive constructions in these two languages can provide interesting insights in what makes particular elements of languages relatively easy or difficult to acquire, or more or less 'learnable'.

### 1.3. Research questions

The overall research question of this thesis is: *How do crosslinguistic differences concerning syntactic, semantic, and lexical properties of ditransitive constructions contribute to our understanding of children's language acquisition and the learnability problem?* This question will be answered by addressing the following sub-questions:

1. At what age do English and Dutch children acquire the rule(s) of active dative alternation?
2. How do English and Dutch children use the rule(s) of active dative alternation?
3. Do the rule(s) of active dative alternation in English and Dutch apply to passive ditransitive constructions?
4. At what age do English and Dutch children acquire the rule(s) of passive dative alternation?
5. How do English and Dutch children use the rule(s) of passive dative alternation?
6. How conservative are English and Dutch children in the alternations that they allow for newly acquired ditransitive verbs?

Besides a review of the literature and a discussion of several experiments addressing these questions, this thesis contains an additional research proposal and several suggestions for further research. Section 2 will discuss the existing literature on English children's acquisition of active dative alternation, answering sub-questions 1 and 2 for English. Section 2 also discusses the differences and similarities between Dutch and English and the consequences for learnability. As the literature contains no data on Dutch children's acquisition of active dative alternation, answers to sub-questions 1 and 2 for Dutch can only be formed after sections 5 and 6, which contain the results from two new experiments. Sub-question 3 will be addressed in section 3, which discusses English and Dutch passive dative alternation. Section 3 also includes an experimental study that addresses this

sub-question for English. In sections 4-6, experimental studies address sub-questions 3, 4 and 5 for Dutch and in section 7, two experimental studies are proposed that address these questions for English. This thesis ends with a general discussion returning to the main research question (section 8).

## 2. Active dative alternation

### 2.1. English

The learnability problem of active dative alternation can be summarized as follows: the input children receive will often not give explicit evidence for whether a specific verb can alternate between a prepositional dative construction and a double object construction, and children could theoretically form many different hypotheses about which verbs alternate and which do not, but they all grow up to have clear intuitions about the acceptability of different verbs in the different constructions. English-speaking children have been found to produce both active ditransitive constructions from the earliest stages of their child speech, and to use them equally frequently when they are slightly older (see Pinker, 1984, and references therein). Some studies have found that double object constructions are acquired before prepositional dative constructions (Snyder & Stromswold, 1997; Campbell & Tomasello, 2001), but this is not the case for all English-speaking children, and the exact ages of acquisition vary to a large extent (Campbell & Tomasello, 2001). What these studies do show is that children do not first acquire only, for instance, the prepositional dative construction before learning which verbs alternate, but have knowledge of both constructions from early on.

As was discussed in the introduction, to grasp how all children acquire dative alternation despite the learnability problem, we must answer the questions of whether there are regularities between alternating verbs, and whether children use these regularities to form rules. Over the past decades, multiple solutions have been proposed, which can often be grouped under either the *conservatism hypothesis* or the *criteria hypothesis* (Gropen, Pinker, Hollander, Goldberg, & Wilson, 1989). According to the conservatism hypothesis, there may be regularities between alternating verbs, but forming rules which capture such regularities only serves to summarize the information that is stored in the lexicon. If similar kinds of verbs show similar alternation behavior, storing the information about this behavior in the lexical entry of each and every verb takes up many resources, whereas forming a rule lowers the cognitive load (see also Yang, 2016). However, in this view, rules are not used to make predictions and are not extended to new items without positive evidence that these items are not exceptions. Baker (1979) distinguishes between ‘benign’ exceptions to obligatory rules (i.e., irregular forms), which can be learned through positive evidence after a rule has already been formed, and ‘embarrassing’ exceptions to optional rules, which cannot be so learned, and he groups non-alternating ditransitive verbs under embarrassing exceptions. In this view, if children extended the rule that ditransitive verbs optionally alternate to all ditransitive verbs, it would be impossible for them to learn which ditransitive verbs do not alternate. Rather, the conservatism hypothesis claims that children are very conservative and learn item-by-item: only if they have heard a specific verb in both ditransitive constructions will they assume it is an alternating verb (Baker, 1979). In practice, this means that children will not make overgeneralization mistakes, that is, mistakes treating a non-alternating verb as an alternating verb.

However, not all researchers agree on the status of non-alternating ditransitive verbs as mere exceptions to an optional rule. Stowell (1981) and others claim that, at least in English, the dative alternation rule is subject to specific semantic and morphophonological (also called morphological, e.g., by Stowell, 1981) constraints that determine which verbs alternate and which do not. According to the criteria hypothesis, this has consequences for acquisition. In this hypothesis, children are believed to be sensitive to the semantic and morphophonological regularities between the different alternating verbs they hear in their input. Moreover, based on these regularities, they form productive rules, which they then generalize onto other verbs and use in production (Mazurkewich & White, 1984). Because children need time to receive enough input, deduce the dative alternation rules, and find out if there are exceptions to those rules, they are predicted to sometimes make mistakes overgeneralizing the dative alternation rule, using non-alternating verbs in double object constructions.

To summarize, the conservatism hypothesis and the criteria hypothesis differ in how they define the rule(s) of dative alternation, which has consequences for how children are predicted to use the regularities between alternating verbs in their acquisition process. The semantic and morphophonological constraints on dative alternation proposed by supporters of the criteria hypothesis will be discussed in subsection 2.1.1 and 2.1.2. In subsection 2.1.3, empirical evidence for children’s overgeneralization mistakes and sensitivity to the constraints will be reviewed, before discussing Dutch active dative alternation in subsection 2.2.

### 2.1.1. Semantic constraint

According to Stowell (1981), dative alternation is subject to a semantic constraint stating that the indirect object of an alternating transferal ditransitive verb must, in addition to being a recipient or goal, be a prospective possessor. Specifically, the recipient must gain possession of the theme through the action described by the verb (see 15-17). As a consequence, alternating verbs often have animate indirect objects, although not all animate goals are future possessors, as can be seen in (17). The semantic constraint can be rephrased as a semantic difference between the prepositional dative construction and the double object construction, with the former denoting ‘caused motion’ or ‘change of location’ and the latter denoting ‘caused possession’ or ‘change of possession’ (see e.g. Coleman, 2007; Pinker, 2013; Yang & Montrul, 2017).

- |         |                                 |   |
|---------|---------------------------------|---|
| (15) a. | I sent the package to Mary.     | [animate indirect object as possessor]  |
| b.      | I sent Mary the package.        |   |
| (16) a. | I sent the package to New York. | [inanimate indirect object as location] |
| b.      | * I sent New York the package.  |   |
| (17) a. | I sent Mary to the principal.   | [animate indirect object as location]   |
| b.      | * I sent the principal Mary.    |   |

Non-alternating verbs that only occur in the double object construction (see 8) have been argued to be subject to the semantic constraint as well. According to Mazurkewich and White (1984), these verbs do not assign a possessor role, as there is no “transfer in the usual sense” (Mazurkewich & White, 1984:265).

As argued by several researchers (see Gropen et al., 1989; Pinker, 2013), the possibility to denote a change of possession is a necessary but not a sufficient condition for dative alternation. In

the words of Gropen et al. (1989), change of possession is a ‘broad-range rule’, concerning a broad class of verbs. In addition to the broad-range rule, there are multiple ‘narrow-range rules’, which concern more fine-grained distinctions between subclasses of transferal verbs and form the sufficient conditions for dative alternation. For instance, a verb of communication, such as *tell*, falls under such a narrow-range rule allowing it to alternate, but there is no such rule for a verb of manner of communication, such as *shout* (compare *I told him a secret* with *\*I shouted him a secret*.) These narrow-range rules do not only explain why many exceptions to the semantic constraint (i.e., the broad-range rule) have similar meanings, but they also explain how people can have intuitions about new verbs. For instance, when *text* was first used as a verb, speakers recognized it as a verb of communication, which alternates under a narrow-range rule.

The semantic difference between the two ditransitive constructions, as captured by the rephrasing of the semantic constraint, has often been related to syntactic differences between the two constructions. Although prepositional dative constructions and double object constructions have clear surface differences, there is ongoing debate about whether they are derived from one another or not. For example, Larson (1988) claimed, partially based on Chomsky (1975), that the prepositional dative construction and the double object construction have the same underlying form, in which the verb and its objects form an “underlying clause-like VP” (see 18). The prepositional dative construction is formed from (18) through verb raising (see 19) and the double object construction is derived from the prepositional dative construction through a passivization-like operation (Larson, 1988). In this type of passivization, the direct object is expressed as an adjunct (like the subject of a clause can be expressed in a *by*-phrase under regular passivization) and *to* is absorbed from the indirect object (like the accusative case is absorbed from the direct object under regular passivization) (see 20a), causing the indirect object to move to the direct object position, thus resulting in a double object construction (see 20b) (Larson, 1988).

- (18) John [VP a letter send to Mary]  
 (19) John send<sub>i</sub> [VP a letter t<sub>i</sub> to Mary]  
 (20) a. John send<sub>i</sub> [VP t<sub>j</sub> t<sub>i</sub> Mary [a letter]<sub>j</sub>]  
       b. John send<sub>i</sub> [VP Mary<sub>k</sub> t<sub>i</sub> t<sub>k</sub> [a letter]<sub>j</sub>]

Others, however, such as Czepluch (1982) and Mazurkewich and White (1984), claimed that the constructions are distinct and verbs that alternate have two separate subcategorization frames stored in the lexicon. More recent approaches are in line with the latter view, often claiming that, whereas the indirect object of a prepositional dative construction is introduced by a preposition, in a double object construction it is introduced by an applicative head, an element that introduces a non-core argument (McGinnis, 2001; 2008).<sup>6</sup> Interestingly, supporters of both views directly relate syntax and semantics. Supporters of the former view claim that the two constructions have identical semantics, so their syntactic structures must be identical as well. However, supporters of the latter view argue that subtle semantic differences between the constructions, as captured by the semantic

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<sup>6</sup> For opposing views, see Bresnan’s work (Bresnan, 2007; Bresnan et al., 2007; Bresnan & Nikitina, 2007), where it is argued that the choice between the structures depends on factors like definiteness, animacy or length. See also Bruening (2010) for a reaction to Bresnan’s work.

constraint, mean that the constructions must be syntactically distinct as well. The psychological reality of the semantic constraint, including the broad-range rule and the narrow-range rules, has been repeatedly demonstrated experimentally; for adults' sensitivity to the semantics of both existing and novel verbs, see Ambridge, Pine, Rowland, & Chang (2012). From this evidence for the semantic constraint it follows that the two constructions must be syntactically distinct as well. However, it is important to note that there is no syntactic information in the verb itself from which speakers can deduce if it alternates or not. As extensively argued by Pinker (2013), there are no visible syntactic differences between alternating and non-alternating verbs. If the syntactic differences are invisible, for instance in the form of abstract features on verbs, the question remains how children would ever learn which verb has which feature. In Pinker's words: "[a]bstract syntactic representations are colorless, odorless, and tasteless" (Pinker, 2013:41). For these reasons, in this study, the syntactic distinctness of the two constructions is grouped together with their semantic distinctness and not separately investigated.

Regarding acquisition, if there are indeed semantic and syntactic differences between the double object construction and the prepositional dative construction, Hartshorne, O'Donnell, Sudo, Uruwashi, Lee and Snedeker (2016) predict that children will become aware of the semantic constraint at an early age, because they have been found to be aware of the relation between syntax and semantics from the early stages of language development (see Pinker, 1984; Gleitman, 1990). However, Hartshorne et al.'s prediction does not necessarily mean that children will not make any mistakes with the semantic constraint. Before turning to children's overgeneralizations, however, the second constraint on dative alternation, the morphophonological constraint, will be discussed in the next section.

### 2.1.2. Morphophonological constraint

The morphophonological constraint has been defined in multiple ways by different authors, but is probably best known as the distinction between 'native' and 'Latinate' transferal verbs. Assuming they obey the semantic constraint, native verbs (i.e., verbs of Germanic origin) generally alternate (see 21), but Latinate verbs (i.e., verbs of Latin origin) do not (see 22) (Stowell, 1981; Mazurkewich & White, 1984).

- (21) a. I gave money to the hospital  
       b. I gave the hospital money.  
 (22) a. I donated money to the hospital.  
       b. \* I donated the hospital money.

This distinction between native and Latinate verbs also plays a role in morphological processes, such as affixation. In English, some suffixes, like *-ity*, are only grammatical with Latinate stems (see 23), but not with native stems (see 24):

- (23) fragile – fragility  
 (24) weak – \*weakity

Although several studies have demonstrated adults' sensitivity to this distinction, concerning both dative shift (e.g. Ambridge et al., 2012) and affixation (e.g. Randall, 1980), it is unlikely for people to be so intuitively aware of history and etymology in their spontaneous speech. It would be especially surprising if children used such knowledge in their acquisition of dative alternation. Rather, speakers' intuitions appear to be aided by a combination of both morphological and phonological differences between native and Latinate verbs. Randall (1980) investigated the acceptability ratings given by English-speaking adults to several types of stems followed by the suffix *-ity* and found that novel words with Latinate stress patterns were judged as more acceptable than native stems when followed by such suffixes, but not as well-formed as real Latinate stems. Randall concluded that the distinction between Latinate and native verbs is morphophonological "in that there is a morphological class whose members can be recognized partially by their phonological properties" (Pinker, 2013:56). The role played by phonological differences between the verb types is supported by Stowell (1981) and Pinker (2013), who claim that when people use Latinate verbs in a double object construction, they often use a native stress pattern ('*dónate*', not '*donáte*'), although it is unknown if these people allow the Latinate stress pattern under other circumstances.

As adults' sensitivity to the semantic constraint and the morphophonological constraint on dative alternation has been established, the question is how children use these constraints. Empirical evidence for both children's violations of and sensitivity to the constraints will be discussed in the next subsection.

### **2.1.3. Children's overgeneralizations**

The conservatism hypothesis and the criteria hypothesis predict very different behavior by children acquiring dative alternation: according to the former, children are conservative and will not make any overgeneralization mistakes, applying the rule of dative alternation to non-alternating verbs, whereas the latter predicts that they will overgeneralize, violating the semantic constraint and/or the morphophonological constraint on dative alternation. Data from spontaneous and elicited production can tell which of the two hypotheses may explain how English-speaking children acquire dative alternation despite the learnability problem. In addition, if children are found to overgeneralize, investigating which constraint is violated by children of what ages can show when exactly the constraints on dative alternation are acquired.

Mazurkewich and White (1984), who are advocates of the criteria hypothesis, reviewed English-speaking children's productions of double object constructions and found several instances of overgeneralization. Until at least the age of five, children were found to violate the semantic constraint in these overgeneralizations, which led Mazurkewich and White to conclude that this constraint is not acquired until that age. This conclusion was partly supported by Gropen et al. (1989), who found that children between 1;6 and 6;6 sometimes made mistakes overgeneralizing dative alternation. However, they also found that all these overgeneralizations expressed "either literal change of possession (concrete or communicative) or the benefactive/malefactive relation, which may be an extension of possessional structures to a more abstract semantic field" (Pinker, 2013:365). The findings by Gropen et al. (1989) suggest that children who have not yet acquired the semantic constraint may produce double object constructions containing verbs that do not alternate in adult English, although they are not completely insensitive to it, as they obey at least the broad-range rule. This conclusion is in line with the prediction made by Hartshorne et al.'s (2016) (see

section 2.1.1). However, Ambridge et al. (2012), found that neither five-year-old nor nine-year-old children used the English narrow-range rules, such as the rules distinguishing verbs of communication (e.g., *tell*) from verbs of manner of communication (e.g., *shout*), in an adult-like manner when judging the acceptability of double object constructions containing both existing and novel verbs. To summarize, around the age of five, English-speaking children appear to have acquired the semantic broad-range rule, but not the semantic narrow-range rules. Although it is not known exactly when the narrow-range rules are acquired, it is clear that children make overgeneralization mistakes before that point.

Regarding the morphophonological constraint, Mazurkewich and White (1984) comment on an apparent lack of evidence of younger children violating this constraint, and warn that this lack of evidence does not necessarily mean that this constraint is already acquired at a young age. On the contrary, Mazurkewich and White (1984) argue that most of the relevant verbs, that is, the Latinate verbs, have not even been acquired yet. If a five-year-old does not use the word *donate* at all, they will obviously not use it in a double object construction. Mazurkewich (1982) therefore focused on how older children, nine to fifteen years old, judge the acceptability of double object constructions violating either the semantic broad-range rule or the morphophonological constraint. Whereas the nine-year olds accurately rejected double object constructions that violated the semantic constraint, they scored at chance when judging double object constructions with Latinate verbs, that is, violations of the morphophonological constraint. The older the children were, the more accurately they rejected Latinate double object constructions, until showing adult-like behavior at the age of fifteen. In line with Mazurkewich' (1982) results, Ambridge et al. (2012) found five-year-old children to appear insensitive to the morphophonological properties of both existing and novel verbs in an acceptability judgment task. However, unlike Mazurkewich (1982), Ambridge et al. (2012) found that older children, specifically nine-year-olds, were sensitive to the morphophonological constraint when only existing verbs were considered. Ambridge et al.'s conclusion was that the distinction between native and Latinate verbs is psychologically real for nine-year-old children, but at this age, they have not yet formed a general rule that they (over)generalize.

At this point, the first two sub-questions, concerning the age of acquisition of active dative alternation and children's use of active dative alternation rules, can be answered for English. English-speaking children use double object constructions and prepositional dative constructions from the early stages of child speech, but the rules of dative alternation are acquired later in their development. The semantic constraint is largely acquired around the age of five, although not all semantic narrow-range rules are acquired yet at this age. When the semantic constraint is in place, children start to learn more Latinate verbs and acquire the morphophonological constraint, possibly as late as at the age of fifteen. Before the constraints are acquired, children may show some sensitivity to them, but they may also violate them. While rules are being formed, children already apply those unadultlike rules productively, which may result in mistakes overgeneralizing dative alternation, where they apply the rules to non-alternating verbs. The fact that children have been found to overgeneralize dative alternation clearly goes against the predictions following from the conservatism hypothesis: instead of learning item-by-item, children learn by forming and generalizing rules, as predicted by the criteria hypothesis. It is important to note that, although children's overgeneralizations of dative alternation have often been reported to be infrequent or anecdotal, they are, in fact, not less frequent than other, less controversial overgeneralizations known to be made by children. Yang and Montrul (2017) found that, for both dative alternation (based on Gropen

et al., 1989) and for past tense formation (based on Marcus et al., 1992), around 5% of all tokens produced by children are overgeneralizations.

Although the empirical data discussed in this subsection clearly support the criteria hypothesis and not the conservatism hypothesis, the criteria hypothesis does not predict exactly *how* productively children use the rules they have formed. Do children apply the rules of dative alternation to all plausible items? This question was addressed by Gropen et al. (1989), who taught children between five and nine years old novel ditransitive verbs, and elicited different constructions with these verbs. The children showed some sensitivity to the two constraints, as the amount of double object constructions produced varied depending on the animacy of the indirect object (in line with the semantic constraint) and the number of syllables of the verb (approximating the morphophonological constraint). However, in the majority of cases, the children used the novel verbs in the same constructions in which they first heard them. In other words, although children display a form of learning that makes use of rules and they overgeneralize these rules in production, at the same time, they are quite conservative. Recent work by Yang (2016; see also Yang & Montrul, 2017) addresses the co-existence of item-by-item learning and rule learning as well. Yang's starting point is uncontroversial: in language use, regular forms are created through the application of rules (for example, the rule of dative alternation, restricted by the semantic and the morphophonological constraints) to items stored in our lexicon, but exceptional forms come directly from the lexicon. For instance, if a Latinate verb alternates, there is no rule predicting it to do so, so this information must be stored in the verb's lexical entry. Even advocates of the conservatism hypothesis, like Baker (1979), acknowledge that rules can serve to summarize the information that would otherwise be stored separately for each and every regular item. What Yang adds is a formula, called the Tolerance Principle (see 25), which calculates the relative amount of exceptions a productive rule is allowed to have, based on Zipf's law (Zipf, 1949) for word frequencies. In other words, the Tolerance Principle gives the exact ratio between regular items and exceptions that forms the tipping point between a productive rule and an unproductive one. Similarly, Yang's Sufficiency Principle (see 26) takes the ratio between regular and exceptional items that a child hears in the input, and determines whether it requires less cognitive resources to store all items individually or to form a rule.

- (25) Tolerance Principle: If  $R$  is a productive rule applicable to  $N$  candidates, then the following relation holds between  $N$  and  $e$ , the number of exceptions that could but do not follow  $R$ :

$$e \leq \vartheta_N \text{ where } \vartheta_N = N/\ln N$$

- (26) Sufficiency Principle: Let  $R$  be a generalization over  $N$  candidates, of which  $M$  items are attested to follow  $R$ .  $R$  can be extended to all  $N$  items if and only if:

$$N - M \leq \vartheta_N \text{ where } \vartheta_N = N/\ln N$$

From these principles, Yang shows, it follows that children need sufficient input, with overwhelmingly more regular forms than exceptions, before it is worth forming a productive rule, that is, a generalizable rule. In addition, the Sufficiency Principle leaves room for differences between children. Depending on the quality of the input a child receives, they may formulate the rules of



dative alternation at an earlier or later age than other children. In other words, the Sufficiency Principle may explain the general variation in child acquisition data and some of the differences in the findings of the studies discussed above. Moreover, it can be interpreted as an explanation for why children form rules but are conservative at the same time. Even if a child has formed a rule based on the input, they are still on the lookout for exceptions; if they hear too many exceptions, they should abandon the rule.

Despite children's relatively conservative behavior, the findings discussed in this subsection clearly show that English-speaking children use both the semantic and the morphophonological constraint on dative alternation in their acquisition process, as proposed by Stowell (1981) and others. The remainder of this subsection is devoted to a brief discussion of how children acquire these constraints. How do children understand which specific semantic and morphophonological properties of prepositional dative constructions and double object constructions are relevant? Both Mazurkewich and White (1984) and Yang and Montrul (2017) have argued that this happens through exposure to positive evidence alone. According to Mazurkewich and White (1984), the trigger for realizing that the notion of possession is important in dative alternation comes from double object constructions expressing inalienable possession, as in (27). Such double object constructions do not involve transfer to a goal, helping children realize that a ditransitive verb must express a change of possession and not (just) a change of location to be able to alternate. According to Mazurkewich and White (1984), children's early productions of possessive constructions are evidence for their claim that children learn to pay attention to the possession from the early stages of their development.

(27) The book cost John five dollars.

Using Yang's Sufficiency principle, Yang and Montrul (2017) calculated that the input children receive contains enough double object constructions where possession plays a clear role to fulfill the Sufficiency Principle, thereby supporting Mazurkewich and White's claim that children do not need any innate knowledge about the semantic constraint.<sup>7</sup> However, unlike Mazurkewich and White (1984), Yang and Montrul (2017) do not provide any explicit examples of sentences triggering children's sensitivity to possession as a crucial property of alternating verbs and eliminating alternative hypotheses about which verbs alternate that children could have formed based on the input. Regarding the morphophonological constraint, neither Mazurkewich and White (1984) nor Yang and Montrul (2017) give a specific explanation of the acquisition process, but both studies claim that children acquire all constraints through positive evidence. Finally, both articles highlight the view that all exceptions to the constraints can be learned through positive evidence as well. If this claim is true, there can be only one kind of exception: verbs that alternate even though narrow-range rules and/or the morphophonological constraint would prohibit them from doing so. Exceptions of verbs not alternating despite following all rules and constraints could not be learned from the input, as these are what Baker (1979) called embarrassing exceptions. Future research should address the question of how the constraints on dative alternation and the exceptions to the rules are learned in more detail.

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<sup>7</sup> This claim is based on a corpus study performed by Yang and Montrul (2017) on all the child-directed speech in the North American English section of the CHILDES database (MacWhinney, 2000).

To summarize this subsection, young English-speaking children are sensitive to the semantic constraint on active dative alternation, as shown by children's utterances obeying at least the broad-range rule, although until age five, this constraint is occasionally violated. At a later age, as children learn more and more Latinate verbs, the morphophonological constraint is acquired, although violations of this constraint still occur until age fifteen. Violations of both constraints are not very common (which is also the case for overregularizations of past tense verbs) and children mainly show conservative behavior, mostly using verbs in constructions they have heard them in before. In the next subsection, the constraints on Dutch dative alternation will be compared to the English situation, followed by predictions for the acquisition pattern of Dutch children.

## 2.2. Dutch

Dative alternation differs between Dutch and English regarding both the semantic constraint and the morphophonological constraint. The first difference is that, although the broad-range part of the semantic constraint applies in Dutch the same way as in English (see 28), the two languages have different narrow-range rules. For example, *throw*-type verbs and *carry/slide*-type verbs are allowed in double object constructions in English, but not in Dutch (Colleman, 2007) (see 29).

- (28) a. Jan stuurde Marie een pakket.  
 Jan sent Marie a package  
 'John sent Mary a package.'
- b. \* Jan stuurde New York een pakket.  
 Jan sent New York a package  
 'John sent a package to New York.'
- (29) a. John threw Mary a ball.
- b. \* Jan gooide Marie een bal.  
 Jan threw Marie a ball  
 'John threw Mary a ball.'

This difference in itself is not surprising, as there are many examples of crosslinguistic differences in the narrow-range rules of dative alternation (see Levin, 2008; Yang & Montrul, 2017). The second semantic difference between Dutch and English is more striking. In Dutch, besides the prepositional dative construction with *aan* 'to' (see 30a), there appears to be a second prepositional dative construction with *naar* 'towards' (see 30b). Some verbs, as in (30), can take both prepositions, but this is not the case for all verbs (see 31). Only the verbs that can occur with *aan* are also allowed in the double object construction (compare 30 with 31).

- (30) a. Jan stuurde een pakket aan Marie.  
 Jan sent a package to Marie  
 'John sent a package to Mary.'
- b. Jan stuurde een pakket naar Marie.  
 Jan sent a package towards Mary  
 'John sent a package to/towards Mary.'

- c. Jan stuurde Marie een pakket.  
Jan sent Marie a package  
'John sent Mary a package.'
- (31) a. \* Jan gooide een bal aan Marie.  
Jan threw a ball to Marie  
'John threw a ball to Mary.'
- b. Jan gooide een bal naar Marie.  
Jan threw a ball towards Mary  
'John threw a ball to/towards Mary.'
- c. \* Jan gooide Marie een bal.  
Jan threw Marie a ball  
'John threw Mary a ball.'

According to Coleman (2007), this difference in acceptability between a sentence like (31a) and its English counterpart (i.e., *John threw a ball to Mary*) is a consequence of the semantic differences between prepositions *to* and *aan*. *To* is an allative marker, meaning it can introduce both a spatial goal and a recipient, but *aan* is a locative marker, denoting "a relation of spatial 'contact' between two stationary entities" (Coleman, 2007:4), which can introduce a recipient, but not a spatial goal. In Dutch, to express a spatial goal, the preposition *naar* must be used. In other words, the semantic constraint applies to both Dutch double object constructions and prepositional dative constructions, as these constructions "both require a prospective possessor as the theme's endpoint" (Coleman, 2007:5).<sup>8</sup> In contrast, the construction with *naar* expresses a change of location, as does the English *to*-dative.

The third difference between Dutch and English is that there is no evidence for a morphophonological constraint on active dative alternation in Dutch. Like English, Dutch does distinguish between native and Latinate stems when it comes to morphological processes, as the suffix *-iteit* ('-ity') is only well-formed in combination with a Latinate stem (32), not with a native stem with the same meaning (33). However, there is no clear evidence for an effect of this distinction on dative alternation in Dutch.

(32) fragiel – fragiliteit  
'fragile' 'fragility'

(33) zwak – \* zwakkiteit  
'weak' lit. 'weakity'

The fact that the native-Latinate distinction plays a role in English dative alternation but not in Dutch dative alternation can be explained in the same way as the differences between the narrow-range rules that apply in these and other languages. Simply put, dative alternation is subject to lexical arbitrariness (see Yang & Montrul, 2017). Just like there are narrow-range rules and exceptions within a language, there are differences between languages (see Levin, 2008). Importantly, the

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<sup>8</sup> Coleman does not exclude the possibility that there is some other semantic difference between the two double object construction and the *aan*-dative constructions in Dutch.

necessary condition on dative alternation, that is, the broad-range rule stating that a double object construction must express a change of possession, applies in both languages.

The differences between Dutch and English discussed in this subsection have consequences for the relative learnability of active dative alternation in both languages. First, whereas in English the semantic constraint determines only under which circumstances the double object construction can occur, in Dutch, both the double object construction and the prepositional dative construction with *aan* 'to' are subject to this constraint. As a result, in Dutch, if a child hears a verb in either an *aan*-dative or in a double object construction, they can generally safely assume that it is an alternating verb. In English, however, a child can only make this assumption if they hear a verb in a double object construction. As a result, English children are predicted to need more input and therefore, on average, more time than Dutch children before being able to deduce the semantic constraint. Second, the lack of evidence for a morphophonological constraint in Dutch means that Dutch children need to acquire only one constraint (i.e., the semantic constraint) on dative alternation, whereas English-speaking children need to acquire two constraints on dative alternation. The morphophonological constraint has been found to take especially long to master, with English-speaking children violating it until as late as age fifteen.

To summarize, Dutch children are predicted to need much less time than English-speaking children to acquire the rules of active dative alternation, as in Dutch there is only one constraint, the semantic constraint, whereas English active dative alternation is subject to an additional morphophonological constraint, which is not easily acquired. Furthermore, the Dutch semantic constraint is arguably easier to learn than its English counterpart. This prediction needs to be empirically tested by comparing both comprehension and production data from Dutch and English children of different ages. As a first step, in this thesis, comprehension experiments are conducted with Dutch children (see section 5-6) and an English comprehension study is proposed as well (see section 7). In language acquisition, comprehension is often believed to precede production, implying here that even if children do not (often) produce fully grammatical prepositional dative constructions and double object constructions, it is very well possible that they can correctly interpret them. As soon as we know at what age children can comprehend active ditransitive constructions, production studies can be designed as well.

Despite the important differences between Dutch and English that were discussed in this section, overall, these differences are relatively minor compared to the differences regarding ditransitive passives. The next section will focus on the differences with respect to ditransitive passives and discuss the consequences of these differences for learnability.

### 3. Passive dative alternation

As was discussed in the Introduction (section 1), passive ditransitive constructions are also interesting from both a comparative acquisition perspective and a rule-based-learning perspective. This section starts with the rule-based-learning perspective in a discussion of ditransitive passives in English (subsection 3.1). The experimental study discussed in subsection 3.2 finds both similarities and differences between passive dative alternation and active dative alternation in English. Because active and passive dative alternation are similar but not identical, there is reason to believe that the acquisition processes of the two phenomena are intertwined. The expected acquisition patterns are discussed in subsection 3.2, before turning to the comparative perspective in a discussion of Dutch

ditransitive passives (subsection 3.3). Section 3 concludes that there are major differences between Dutch and English ditransitive passives, which has consequences for the expected acquisition patterns.

### 3.1. English

The surface structural differences between the two active ditransitive constructions in English can be summarized as follows: in the prepositional dative construction (e.g., *John gave a book to Mary*), the theme precedes the goal which is introduced by a preposition, whereas in the double object construction (e.g., *John gave Mary a book*), the goal precedes the theme and neither is preceded by a preposition. Mirroring the two active ditransitive constructions, English has two passive ditransitive constructions with those same properties: the direct object passive (see 34) and the indirect object passive (see 35). In direct object passives, the theme is in subject position, the goal is introduced by a preposition, and the agent is optionally stated in a by-phrase (as is the case in all passives) (see 33). In indirect object passives, the goal is in subject position and the theme stays in direct object position (see 34).

- |      |                                       |                           |
|------|---------------------------------------|---------------------------|
| (34) | The book was given to John (by Mary). | [direct object passive]   |
| (35) | John was given the book (by Mary).    | [indirect object passive] |

These surface similarities between the prepositional dative construction and the direct object passive and between the double object construction and the indirect object passive suggest a direct relation between these respective constructions. As a consequence, the same constraints that apply to active dative alternation may be expected to apply to passive dative alternation as well, so that the same verbs that can occur in the double object construction are allowed in the indirect object passive and vice versa. This null hypothesis seems to be supported when we look at the semantic constraint:

- |         |                                    |
|---------|------------------------------------|
| (36) a. | I sent the package to New York.    |
| b.      | * I sent New York the package.     |
| c.      | The package was sent to New York.  |
| d.      | * New York was sent the package.   |
| (37) a. | I rolled the ball to the corner.   |
| b.      | * I rolled the corner the ball.    |
| c.      | The ball was rolled to the corner. |
| d.      | * The corner was rolled the ball.  |

However, informal judgments as in (38-39) seem to support the alternative hypothesis that the relation between active and passive alternation is not one-to-one: the indirect object of a Latinate verb (see 38) is, at least according to some speakers of English, not as ill-formed as the active double object construction (see 39).

- |      |                                      |
|------|--------------------------------------|
| (38) | * He donated the church some money.  |
| (39) | ? The church was donated some money. |

Different predictions for language acquisition follow from these two hypotheses. Before discussing these predictions, a grammaticality judgment test with adults (study 1) will show whether the relation between active dative alternation and passive alternation is generally one-to-one or not. As the semantic constraint quite clearly seems to apply to both, the focus will be on the morphophonological constraint.

## 3.2. Study 1: The morphophonological constraint in adult English

### 3.2.1. Research question

The question addressed in this study is sub-question 3: Do the rule(s) of active dative alternation apply to ditransitive passive constructions? Specifically, the role of the morphophonological constraint is investigated through an auditory acceptability judgment task with English-speaking adults. If the morphophonological constraint applied to both active and passive ditransitive constructions, both double object constructions and indirect object passives with Latinate verbs would be expected to be judged as equally ill-formed. However, based on the informal judgments in (38-39), differences in judgments can be expected between the two constructions.

### 3.2.2. Materials and method

#### 3.2.2.1. Participants

The participants were 36 students at Michigan State University (9 men, 27 women), aged between 18 and 22 ( $M = 19.66$ ,  $SD = 1.07$ ). They received partial course credit for their participation. Informed consent was obtained from all participants. Three participants were excluded from further analysis because they had native languages other than American English.

#### 3.2.2.2. Materials

The materials consisted of 20 prerecorded test sentences and 80 prerecorded filler sentences, to be judged on acceptability by the participants. The test sentences contained both native and Latinate verbs in both active and passive constructions: five double object constructions with native verbs, five indirect object passives with the same native verbs, five double object constructions with Latinate verbs, and five indirect object passives with the same Latinate verbs. The sentences containing the same verbs were otherwise distinct from each other, for instance, having different arguments (see 40-41). (For an overview of all test sentences, see Appendix A.)

- (40) The teacher narrated the bored class a story. [double object construction]  
(41) John was narrated a beautiful story from Japan. [indirect object passive]

The sentences were presented auditorily in a random order, in which no more than two sentences of the same experimental condition were in a direct sequence. This order was the same for all participants.

### **3.2.2.3. Design**

The experiment used a 2x2 within-subjects design, with verb type (native or Latinate) and construction (double object construction or indirect object passive) as factors. The dependent variable was grammaticality judgment, which was measured on a Likert scale from 1 to 5.

### **3.2.2.4. Procedure**

The participants participated in the task individually, while seated behind a computer. First, the computer screen showed written instructions, which explained the task and asked the participants to judge each sentence on a scale from 1 to 5, with 1 being “a very bad sentence that you would never say” and 5 “a very good sentence that sounds perfectly normal to say”. After reading these instructions, participants could continue to the task. While the first sentence played, the computer screen showed a scale with the numbers 1 to 5. The extreme ends of the scale were labeled “very bad” and “very good”, respectively. After listening to the sentence, participants had to click on one of the numbers before being able to continue to the next sentence. Each sentence was played once.

### **3.2.3. Results**

A repeated measured ANOVA was conducted to determine effects of verb type (native or Latinate verbs) and/or construction (double object construction or indirect object passive) on the mean acceptability ratings of the test sentences.<sup>9</sup> No outliers were found in the data, as assessed by inspection of a boxplot. The Likert scale ratings were transformed into z-scores, as recommended by Schütze and Sprouse (2014). Shapiro-Wilks tests showed that the z-scores were normally distributed for each verb type ( $p > .05$ ). Sphericity was assumed, as both factors had only two levels.

Table 1 shows the mean acceptability ratings on a scale of 1 to 5 per verb type per construction, as well as these Likert scale scores transformed into z-scores. The mean acceptability ratings range from 3.5 to 4.5 on the Likert scale. This means that none of the sentence types, including double object constructions with Latinate verbs, was generally judged as unacceptable. This seems unexpected based on previous literature, as Latinate double object constructions are generally classified as ungrammatical. However, the standard deviations of both Latinate sentence types are larger than the standard deviations for the native sentence types, meaning there was more variation between participants in their judgement of the Latinate sentence types than in the native sentence types.

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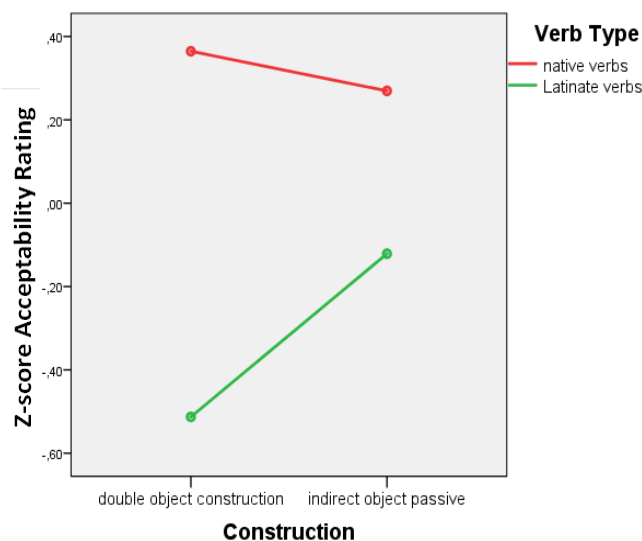
<sup>9</sup> For a justification for running this parametric test on Likert scale data, see Schütze and Sprouse (2014).

**Table 1.** Mean acceptability ratings of native and Latinate verbs in active double object constructions and in indirect object passives, given on a Likert scale from 1 to 5 and as z-scores.

Construction	Verb type	Mean (SD) - Likert scale	Mean (SD) - z-scores
Double object construction	Native	4.50 (0.47)	0.36 (0.32)
Double object construction	Latinate	3.56 (0.63)	-0.51 (0.39)
Indirect object passive	Native	4.42 (0.49)	0.27 (0.27)
Indirect object passive	Latinate	3.99 (0.64)	-0.12 (0.36)

The repeated measures ANOVA revealed a significant main effect of verb type,  $F(1,32) = 118.76$ ,  $p < .001$ , and a significant interaction effect between verb type and construction,  $F(1,32) = 11.86$ ,  $p = .002$ . There was no significant main effect of construction,  $F(1,32) = 3.91$ ,  $p = .057$ . Post hoc Bonferroni tests showed that the mean acceptability rating (in z-scores) of sentences with Latinate verbs ( $M = -.32$ ,  $SD = .03$ ) was significantly lower than the mean acceptability rating of sentences with native verbs ( $M = .32$ ,  $SD = .03$ ),  $p < .001$ . The mean acceptability rating (in z-scores) of double object constructions ( $M = -.07$ ,  $SD = .04$ ) did not significantly differ from the mean acceptability rating of indirect object passives ( $M = .07$ ,  $SD = .04$ ),  $p = .057$ .

The interaction effect between verb type and construction (see Figure 1) was further investigated through simple main effects analysis. Whereas the acceptability ratings of sentences with native verbs were not affected by construction ( $p = .271$ ), indirect object passives with Latinate verbs were judged as more acceptable than Latinate double object constructions ( $p = .002$ ). This is in line with the informal judgments in (37-38). However, the acceptability ratings of both Latinate double object constructions ( $p < .001$ ) and Latinate indirect object passives ( $p < .001$ ) remained significantly lower than the acceptability ratings of those constructions containing native verbs.



**Figure 1.** Interaction effect between construction and verb type. For sentences with native verbs, the acceptability ratings did not differ between double object constructions and indirect object passives. For sentences with Latinate verbs, the acceptability rating of indirect object passives was higher than the acceptability rating of double object constructions. For both double object constructions and indirect object passives, the acceptability rating of native verbs was higher than the acceptability rating of Latinate verbs.



### 3.2.4. Discussion

The results show that, in English, the morphophonological constraint plays a different role in active dative alternation than in passive dative alternation. Sentences with native verbs were judged as equally well-formed in indirect object passives as in double object constructions, but Latinate verbs appear to be more acceptable in indirect object passives than in double object constructions. In both constructions, however, sentences with Latinate verbs had a lower acceptability rating than sentences with native verbs. Interestingly, although the morphophonological constraint is expected to generally prevent Latinate verbs from appearing in double object constructions, study 1 showed that Latinate double object constructions had a mean acceptability rating of 3.5 out of 5, meaning they were not absolutely unacceptable to the participants. It must be noted, however, that there was more variation between participants in their judgments of both Latinate constructions than in their judgments of sentences with native verbs. Future larger-scale studies should further investigate the role of the morphophonological constraint on active and passive dative alternation by investigating differences between (groups of) people and differences between specific (subclasses of) Latinate verbs. Such differences could explain the current results. For instance, there may be more people for whom the morphophonological constraint does not apply to passives than people for whom it does not apply to actives. Similarly, there may be more Latinate verbs that alternate in the passive form than Latinate verbs that (also) alternate in the active form. Still, as it seems unlikely that active and passive forms have completely different representations, future research should also aim at finding different explanations.

In conclusion, based on the findings from study 1, the null hypothesis that the relation between active and passive alternation is one-to-one is rejected, as the interaction effect between verb type and construction showed that not all verbs that are accepted in indirect object passives are equally accepted in double object constructions. Future research is needed to determine the exact nature of the relation between the two phenomena.

Different predictions for language acquisition follow from the different possible effects of morphophonological factors on active and passive alternation. For instance, if there are simply more passive exceptions to the morphophonological constraint than active exceptions, children can learn these exceptions based on positive evidence. However, if the morphophonological constraint does not apply productively to ditransitive passives, because there are more 'exceptions' than 'regular' verbs (see Yang, 2016), children will not form a rule at all. In this case, children possibly first assume the null hypothesis according to which the relation between active and passive dative alternation is one-to-one, before learning that the morphophonological constraint does not apply to passives. However, the role of the morphological constraint should be clearly defined before empirical studies address children's acquisition of Latinate passives.

In contrast to the morphophonological constraint, the role of the semantic constraint appears to be identical in active and passive dative alternation. There are two possible acquisition patterns for English-speaking children. In the first pattern, children acquire the semantic constraint on passive dative alternation in the same way as they acquire the semantic constraint on active dative alternation. In the second, pattern children relate active and passive dative alternation, taking the rules from the former and applying them to the latter. For instance, they might assume that any verb that can occur in the double object construction is allowed in the indirect object passive as well, a hypothesis that holds for native verbs, thereby not directly accessing the semantic constraint.

Assuming the quality of the input is sufficient (as defined by Yang's Sufficiency Principle) and that active forms are generally acquired before their passive counterparts (as is the case with monotransitive verbs; see Koutamanis, 2015, and references therein), forming a rule based on an existing rule is more economical. This is in line with the spirit of Yang's work, as much time and energy would be unnecessarily spent on learning an already existing rule anew for such a closely related phenomenon.<sup>10</sup>

Before proposing experimental studies that address English-speaking children's acquisition of ditransitive passives, the next section is devoted to a discussion of the syntactic, semantic and lexical differences between English and Dutch ditransitive passives, followed by experimental studies that address the same questions about rule-based learning for Dutch in sections 4-6. As will become clear in the next subsection (3.3), the differences between Dutch and English passive dative alternation can be expected to affect the relative learnability of passive dative alternation between the two languages.

### 3.3. Dutch

Dutch ditransitive passives are quite different from English ditransitive passives. Among the Dutch ditransitive passives, the direct object passive (see 42), in which the theme takes the subject position and the goal is introduced by a preposition, is most similar to its English counterpart. However, unlike in English, this construction can also leave out the preposition introducing the goal (see 43).

- |      |  |   |
|------|--|---|
| (42) | Het boek werd   aan Jan overhandigd.<br>the book became to   John handed<br>'The book was handed to John.' | [prepositional direct object passive]   |
| (43) | Het boek werd   Jan overhandigd.<br>the book became John handed<br>'The book was handed to John.'          | [prepositionless direct object passive] |

Like the Dutch prepositional dative construction with *aan* 'to', the Dutch direct object passive is subject to the semantic constraint, as are their English counterparts:

- |      |   |
|------|---|
| (44) | * Het pakket werd   New York gestuurd.<br>the package became New York sent<br>'The package was sent to New York.' |
| (45) | Het pakket werd   (aan) Marie gestuurd.<br>the package became (to) Mary sent<br>'The package was sent to Mary.'   |

---

<sup>10</sup> In this discussion, the notion of 'rule' is used to mean a number of operations that have a specific result. In saying that children take the active dative alternation rule and apply it to passive dative alternation, what is actually meant is that similar operations take place with different lexical items; because in the passive form a passive auxiliary is used, whereas in the active form it is not, the resulting surface forms are different.

The indirect object passive, however, is subject to constraints of quite a different nature and can only be used in very specific circumstances, resulting in infrequent usage (Colleman, 2007). First, lexical constraints cause only specific verbs to be allowed in indirect object passives.<sup>11</sup> Second, the direct object of a Dutch indirect object passive must be non-nominal, meaning that it must be either clausal or absent (Everaert, 1982). Both constraints are illustrated in example (46).

- (46) a. Hij werd gevraagd/verzocht te vertrekken.  
 he became asked /requested to leave  
 'He was asked/requested to leave.'
- b. \*Hij werd iets gevraagd/verzocht.  
 he became something asked /requested  
 'He was asked/requested something.'
- c. Hij werd voorgelezen/vergeven.  
 he became read-to /forgiven  
 'He was being read to/forgiven.'
- d. \*Hij werd een boek voorgelezen/zijn zonden vergeven.  
 he became a book read-to / his sins forgiven  
 'He was read a book/forgiven his sins.'

The differences between Dutch and English ditransitive passives can be accounted for by differences in case. Linguistic theories distinguish three different kinds of case: structural, inherent, and lexical case (see e.g. Woolford, 2006). Structural case, which can be nominative or accusative, is assigned depending on the functional structure of a sentence, regardless of the thematic properties of the NP that receives the case. This makes it highly predictable: NPs in Spec,TP position receive nominative case from finite tense heads and NPs in the complement position of verbs or prepositions receive accusative case from the verb or preposition (Chomsky, 1980). Lexical case assignment is non-structural and unpredictable. It depends on the properties of the specific case-assigning verb or preposition. English does not have this kind of case, but, for instance, some Icelandic verbs take dative themes (Woolford, 2006). Inherent case, which can be genitive or dative, is assigned non-structurally as well, depending on the specific role of the argument. For instance, genitive case is assigned to possessors and dative case is assigned only to goals.

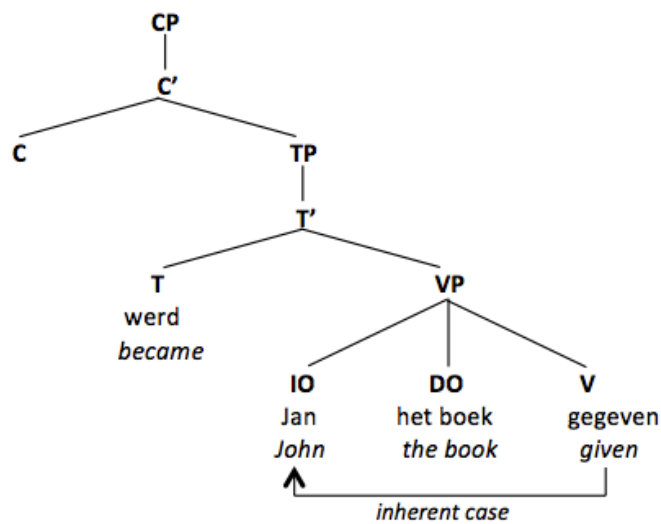
In Dutch and other languages, the subject and the direct object of a double object construction receive structural case from the tense head and the verb, respectively. The indirect object receives inherent dative case from the verb (Everaert, 1982). In contrast, in a prepositional dative construction, the indirect object receives structural case as well, assigned by the preposition. Under passivization, verbs lose their ability to assign structural case, but not inherent case (Chomsky, 1981). As illustrated in the tree structures in (47), if a double object construction is passivized, the theme does not receive case anymore and has to move to the subject position in order to receive structural nominative case from the tense head, resulting in a direct object passive. The goal does

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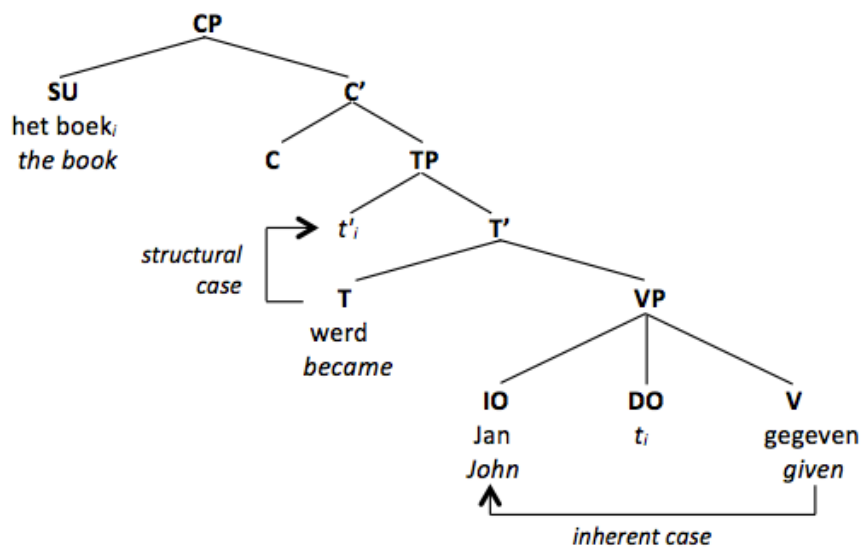
<sup>11</sup> According to Broekhuis, Corver and Vos (2015), these are object control verbs, but more extensive research will need to show if there are additional lexical restrictions and if there are other categories that can appear in this construction.

not need to move, as the passivized verb can still assign inherent case. When a prepositional dative construction is passivized, the theme must move to subject position, because the verb loses its ability to assign structural case, again resulting in a direct object passive. The goal does not need to move, because the case-assigning abilities of the preposition are not affected by passivization of the verb.

(47) a. <sup>12</sup>



b.



<sup>12</sup> In the tree structures in (47) and (49), SU stands for subject position, DO stands for direct object position, and IO stands for indirect object position. Note that the VPs of these tree structures are heavily simplified.

The fact that Dutch direct object passives can be derived from either prepositional dative constructions or double object constructions explains why Dutch direct object passives can, but need not, have a preposition introducing the goal: a prepositionless passive like (43) is derived from a double object construction and a prepositional passive like (42) from a prepositional dative construction.<sup>13</sup> Case also explains why Dutch indirect object passives are allowed if the direct object is absent or clausal: an absent or clausal direct object does not need case, so under passivization, it does not need to move to the subject position, leaving that position open for the indirect object (see 48; the square brackets define the direct object) (Everaert, 1982).

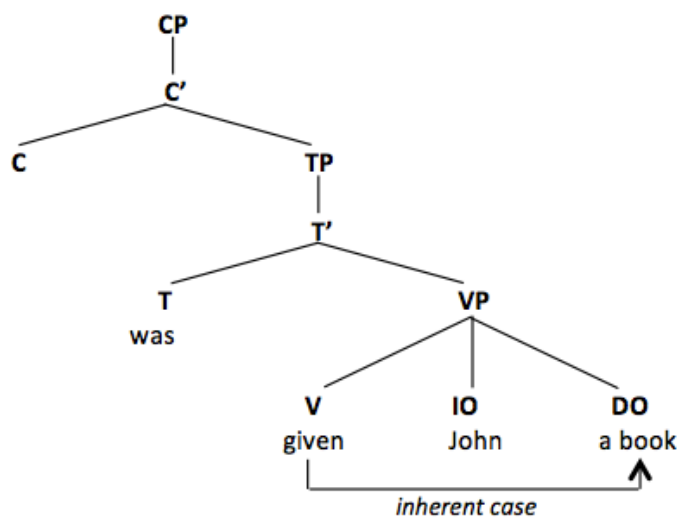
- (48) a. \* Hij werd [het boek] aangeraden.  
           he became the book recommend  
           ‘He was recommended the book.’
- b. Hij werd aangeraden [het boek te kopen].  
           he became recommended the book to buy  
           ‘He was recommended to buy the book.’

The situation in English is quite different from other languages. English lost the difference between accusative and dative case, possibly as a result of English losing almost all of its overt case marking, with the exception of pronouns (Everaert, 1982; Jaeggli, 1986; McGinnis, 2004). In English, the indirect object of a double object construction does not receive inherent dative case, but receives structural accusative case, and the direct object receives inherent accusative case, which is the only occurrence of inherent case in present-day English (Everaert, 1982; Jaeggli, 1986; McGinnis, 2004). As illustrated in the tree structures in (49), if an English double object construction is passivized, the goal no longer receives case and must move to subject position to receive structural nominative case, resulting in an indirect object passive. Note that the theme does not need to move, as the passivized verb still can assign inherent case. The English prepositional dative construction is structurally identical to the Dutch prepositional dative construction, and is passivized as a direct object passive with a preposition introducing the goal.

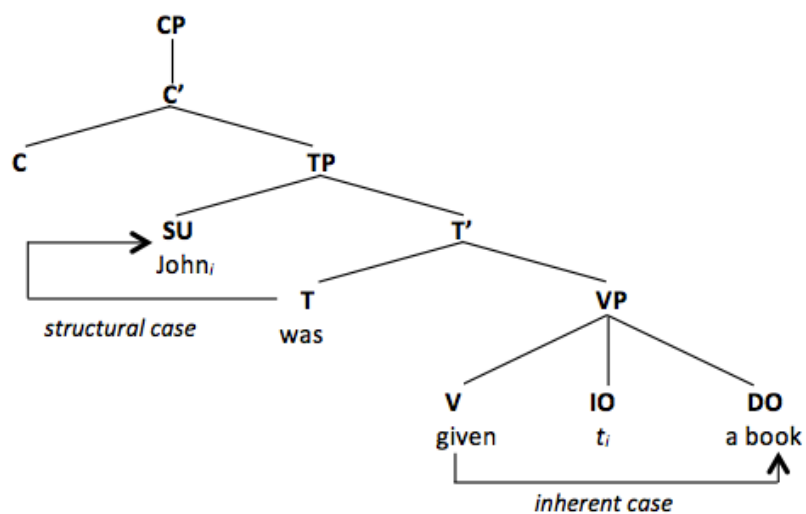
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<sup>13</sup> Again, note that rules in this discussion signify a number of operations that have a specific result. Saying that the passive form is derived from the active form is a simplistic formulation. In reality, several similar operations take place, which have somewhat different results because of the lexical properties of, for instance, the passive auxiliary.

(49) a.



b.



To summarize this subsection so far, in English, the indirect object passive is the passive form of the double object construction, and the direct object passive is the passive form of the prepositional dative construction (as was discussed in subsection 3.1), whereas in Dutch, both the double object construction and the prepositional dative construction can be passivized forming a direct object passive (either with or without a preposition), and the indirect object passive can only be formed if there is a non-nominal direct object. However, Dutch has an additional ditransitive passive, as illustrated in (50):

- (50) Hem werd een boek gegeven.  
 him became a book given  
 'He was given a book.' / 'A book was given to him.'

This construction, which will be called the *him*-construction in this study, is subject both to the semantic constraint (see 51-52) and to factors related to information structure. As can also be seen in (51-52), the direct object position is the focus position, and is usually reserved for new information (typically expressed by indefinite NPs) rather than old information (typically expressed by definite NPs), so only indefinite NPs are allowed as themes (Den Besten, 1989; Broekhuis, Corver & Vos, 2015).

- (51) \* New York werd een pakket /het pakket gestuurd.  
 New York became a package/ the package sent  
 'A/The package was sent to New York.'
- (52) Marie werd een pakket/\*het pakket gestuurd  
 Mary became a package/ the package sent  
 'Mary was sent a/the package.'

Apart from these constraints, the *him*-construction can be used quite unrestrictedly, both in contexts where the indirect object passive is allowed and where it is not (see 53). Consequently, it is much more frequent than the indirect object passive (Samson, 2006; Colleman, 2007).

- (53) a. \* Hij werd een boek aangeraden.  
 he became a book recommended  
 'He was recommended a book.'
- b. Hem werd een boek aangeraden.  
 him became a book recommended  
 'He was recommended a book.'
- c. Hij werd aangeraden een boek te kopen.  
 he became recommended a book to buy  
 'He was recommended to buy a book.'
- d. Hem werd aangeraden een boek te kopen.  
 him became recommended a book to buy  
 'He was recommended to buy a book.'

Although on the surface the *him*-construction looks similar to the English indirect object passive, the two constructions have distinct structures. According to Everaert (1982), the *him*-construction has the structure of an impersonal passive, which, in Dutch, can be formed regardless of verb valency. In (54), we see an impersonal passive containing an intransitive verb and an expletive subject. When monotransitive or ditransitive verbs are used in impersonal passives, their object(s) generally remain in situ, as illustrated by the ditransitive impersonal passive in (55a). According to Everaert (1982), (55b) is derived from (55a): the goal moves from the indirect object position to the

subject position, but it does not receive nominative case, nor does it agree with the verb. From this analysis, it follows that the goal fills the subject position like an expletive subject.

- (54) Er werd gesprongen. [impersonal passive]  
 there(expletive) became jumped  
 'There was jumping.' / 'Someone jumped.'
- (55) a. Er werd hem een boek gegeven. [impersonal passive]  
 there(expletive) became him a book given  
 'He was given a book.' / 'Someone gave him a book.'
- b. Hem werd een boek gegeven. [*him*-construction]  
 him became a book given  
 'He was given a book.'

Den Besten (1989) gives a similar analysis of the *him*-construction: the goal moves to subject position and keeps dative case, while the theme gets nominative case and stays in direct object position. According to Den Besten, the difference between *him*-constructions and impersonal passives with expletive subjects is that the former will most often have a definite goal (see 56a), whereas the latter are preferred when the goal is indefinite (see 56b), for the same information structure reasons that were already mentioned above. In addition, Den Besten rejects an alternative analysis that says that the nominative theme is inverted with the dative goal through a topicalization process, which would mean that the structure of (57a) is identical to the structure of (57b), with the only difference that in (57b) the preposition is expressed and in (57a) it is not.

- (56)a. De/??Een man werd een boek gegeven.  
 the/ a man became a book given  
 'The/A man was given a book.'
- b. Er werd ??de/ een man een boek gegeven.  
 there became the/a man a book given  
 'The/A man was given a book.' / 'Someone gave the/a man a book.'
- (57)a Hem werd een boek gegeven.  
 him became a book given  
 'He was given a book.'
- b. Aan hem werd een boek gegeven.  
 to him became a book given  
 'A book was given to him.'

Finally, Broekhuis, Cover and Vos (2015) analyze the *him*-construction from a different perspective, claiming that the *him*-construction is a direct object passive in which the theme can stay in direct object position if it is an indefinite NP, but must move to subject position if it is definite. They argue that the subject position generally displays old information and prefers definite NPs, whereas the direct object position generally displays new information and prefers indefinite NPs, which is in line with the information structure constraint on *him*-constructions. Although Everaert (1982) and Den Besten (1989) analyzed the *him*-construction as an impersonal (subjectless) passive and Broekhuis, Corver and Vos (2015) explicitly call it a direct object passive, structurally their



analyses do not differ. Whereas Everaert (1982) implicitly called the *him*-construction a subjectless construction, verb agreement data in fact show that Broekhuis, Cover and Vos (2015) were correct in analyzing the *him*-construction as a direct object passive, in which the theme is the subject of the clause (see 60 below).

In Dutch, like in English, only pronouns have overt case markings (with the exception of *u* ‘you [formal]’), so in many cases the *him*-construction and the indirect object passive have the same surface form; the sentence in (58) could have either structure.<sup>14</sup> Disambiguating cues come, besides from case markings on pronouns (see 59), from number agreement (see 60). The example in (60a) is an indirect object passive, as the verb agrees with the goal, whereas (60b) is a *him*-construction, as the verb agrees with the theme.

- (58) De man /Jan /U                      werd    aangeraden    een boek te kopen.  
 the man/John/you(formal) became recommended a    book to buy  
 ‘The man/John/You was/were recommended to buy a book.’
- (59) Hem/Hij werd    aangeraden    een boek te kopen.  
 him /he became recommended a    book to buy  
 ‘He was recommended to buy a book.’
- (60)a. De mannen werden    aangeraden    een boek te kopen.  
 the men    were (pl.) recommended a    book to buy  
 ‘The men were recommended to buy a book.’
- b. De mannen werd    aangeraden    een boek te kopen.  
 the men    was (sg.) recommended a    book to buy  
 ‘The men were recommended to buy a book.’

This leaves many ambiguous cases. Samson (2006) found that, whereas older speakers tend to prefer *him*-constructions to indirect object passives, many younger speakers judge both constructions as equally well-formed or prefer the indirect object passive. These findings suggest that especially younger speakers may not even have a clear preference for either structure when producing an ambiguous sentence like *Jan werd aangeraden een boek te kopen* (‘John (nom./acc.) was recommended to buy a book.’). The fact that the *him*-construction is so freely usable and that it is often indistinguishable from the indirect object passive has not only possibly led to an increase in acceptability of the indirect object passive for adults (Broekhuis, Corver & Vos, 2015), but can also be expected to have consequences for the acquisition process.

Although no certain predictions can yet be made about the role of the morphophonological constraint on English passive dative alternation (see subsection 3.2.4), Dutch passive dative alternation seems much more complex than its English counterpart. Dutch children produce their first intransitive (i.e., impersonal) passives at the same early age as their first monotransitive passives (Verrips, 1996), suggesting no effect of valency on Dutch passive acquisition. However, the facts presented in this subsection lead to the expectation that Dutch children acquire ditransitive passives

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<sup>14</sup> In fact, Broekhuis, Corver and Vos (2015) claim that the indirect object passive in Dutch has emerged as a result of incorrect reanalysis of the *him*-construction cases like (54), where it is unclear if the element in subject position is nominative or accusative.

quite late; in fact, later than English-speaking children. Indirect object passives are highly restricted and infrequent in Dutch, but the *him*-construction, which is much more frequent and less restricted, is often indistinguishable from an indirect object passive. As a result, the Dutch child's task of deducing under which circumstances indirect object passives are allowed in Dutch becomes quite difficult, and Dutch children are expected to need more time than English-speaking children to acquire the restrictions on ditransitive passives.

As a first step in testing this prediction, two comprehension studies were conducted with Dutch children (see sections 5-6). As was explained in subsection 2.2, comprehension often precedes production, so as soon as we know at what age children can comprehend ditransitive passives, it will be possible to design production studies as well. As a starting point, in the current comprehension tasks, children aged between 6 and 10 were tested. By this age, both Dutch and English-speaking children have knowledge of passives in general, as evidenced by their adult-like interpretation of monotransitive passives (see Koutamanis, 2015, and references therein). In section 7, English versions of the same experiments are proposed in order to compare Dutch and English ditransitive acquisition and to ultimately test the predictions made in this study.

Before the Dutch child studies are discussed in sections 5-6, the next section discusses an acceptability judgment task with Dutch adults. This test served as a pretest for the child studies. The child studies were designed to have children judge sentences containing nonsense ditransitive verbs as correct or incorrect descriptions of videos displaying actions for which no Dutch (or English) words exist. Therefore, it was necessary first to test if adults interpreted these sentences and videos as they were intended. Specifically, the videos needed to be interpreted as displaying a change of possession and not just a change of location, which can only be denoted by *naar*-datives.

## 4. Study 2: adult pretest

### 4.1. Goals

The main goal of this pretest was to find out if Dutch adults interpreted the video materials that were made for the child experiments (see sections 5-7) as displaying the intended changes of possession and not just changes of location. This was tested by having adults judge prepositional and prepositionless constructions with nonsense verbs as correct or incorrect descriptions of the videos displaying ditransitive actions. As Dutch has two prepositional dative constructions, the *naar*-dative, which expresses a change of location, and the *aan*-dative, which expresses a change of possession, the prepositional sentences used in this study contained nonsense prepositions. This way, the prepositional sentences were ambiguous between denoting a change of possession and denoting a change of location. Consequently, if the prepositional sentences were accepted, this could both mean that people interpreted the videos as displaying a change of possession and that people interpreted them as displaying a change of location. The prepositionless sentences, however, were expected to be acceptable descriptions only if the videos were interpreted as displaying changes of possession.

In addition to comparing the acceptance rates of prepositional dative constructions and double object constructions, two additional analyses further determined the validity of the materials. First, because the videos depicting the different ditransitive actions occurred multiple times in the test, accompanied by sentences in different constructions, the responses per action were compared

to check for differences between the videos, such as whether any specific videos were not interpreted as intended. Second, besides true descriptions, the test sentences contained (intended) false descriptions, in which several arguments' roles were interchanged. In order to find out if speakers were equally sensitive to which specific arguments were interchanged, the rejection rates of sentences containing different changes were compared as well.

## 4.2. Materials and method

### 4.2.1. Participants

The participants were 46 Dutch-speaking students from Utrecht University (9 men, 36 women, 1 identifying as 'other'), aged 18-42 years old ( $M=20.87$ ,  $SD=3.80$ ). The participants were recruited from an introductory course on language acquisition and participated voluntarily. Informed consent was obtained from all participants. Data from four participants were excluded from further analysis, because Dutch was not their native language.

### 4.2.2. Materials

The materials consisted of 22 different videos and 44 different written sentences. The videos displayed ditransitive actions (i.e., actions involving three arguments) for which no Dutch words exist. These actions all involved transfer between puppets. The 22 videos contained eleven different actions (see Appendix B), each performed by a set of animal puppets in one video, and by a set of Sesame Street puppets in another video. In eight of the eleven actions, the puppets fulfilled all three roles: one puppet was the agent, one the goal, and one the theme. In the remaining three actions, the theme was an everyday object: a shoe, a ball, or a pear. The videos served as the context against which the participants were asked to judge the written sentences (see section 4.2.4 for procedure). Figure 2 shows an example of a pair of videos displaying the same action performed once by the animal puppets and once by the Sesame Street characters. (For an overview of all videos, see Appendix B.)

In the 16 videos displaying the eight puppet-only actions, the roles that the specific puppets fulfilled were alternated so that each puppet performed two roles three times (i.e., in three different videos) and one role twice (i.e., in two different videos).<sup>15</sup> In the six videos displaying the three remaining actions, in which the theme was an inanimate object, each puppet played both the agent and the goal role once. Throughout all videos, there was no one-to-one relation between any animal puppet and any Sesame Street puppet. For instance, in one third of the animal videos, an elephant was the agent, but different Sesame Street characters fulfilled that role in the Sesame Street videos displaying those same actions.

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<sup>15</sup> A mistake during the recording of the videos caused one exception: there is one puppet, a monkey, who fulfills one role four times and two roles twice.



**Figure 2.** Stills from the animal video and Sesame Street video for *troven*, described as “An elephant lies on his back and pushes himself forward by moving his legs, pushes a monkey towards a giraffe; the giraffe catches the monkey,” and “Big Bird lies on his back and pushes himself forward by moving his legs, pushes Cookie Monster towards Elmo; Elmo catches Cookie Monster” in Appendix B.

Besides the videos, the materials consisted of 44 written sentences containing novel ditransitive verbs, which were shown to the participants on the same screen as the videos during the test (see Appendix B for the novel verbs). There were eleven different monosyllabic nonsense verbs, taken from Van Hout (1996).<sup>16</sup> Because the sentences served as (correct or incorrect) descriptions of the videos to be judged on correctness by the participants, each verb was linked to one action, and the arguments of the verbs in the sentences consisted of the names and descriptions of the puppets and objects in the videos. Each verb was used in four different constructions, resulting in the 44 different sentences: every verb appeared in a true prepositional dative construction (see 61a), a true double object construction (see 61b), a monotransitive sentence (see 61c), and either a false prepositional dative construction or a false double object construction (see 61d). Per verb, two of these sentences described a Sesame Street video and two described an animal video, as is the case in (61). In the true prepositional dative constructions and the true double object constructions, the subject, the direct object and the indirect object of the sentences corresponded to the agent, the theme and the goal of the videos, respectively. In the monotransitive sentences, the goal of the action was expressed as the direct object. These sentences served as control items: if the actions in the videos were interpreted as ditransitive actions, as intended, they could never be correctly described by monotransitive sentences. In the false prepositional dative constructions and double object constructions, the roles of two arguments were interchanged. For instance, in the sentences in (61d), the theme and goal roles are interchanged compared to the situation in the video in Figure 2. These false sentences served as control items as well. In the prepositional dative constructions, both true and false, three different nonsense prepositions were used: *pie*, *jot* and *telk*.

- (61) a. De olifant jalpt de aap pie de giraffe. [prepositional dative construction]  
 'The elephant jalps (nonsense verb) the monkey pie (nonsense preposition) the giraffe.'
- b. Pino jalpt Elmo Koekiemonster. [double object construction]  
 'Big Bird jalps (nonsense verb) Elmo Cookie Monster.'
- c. Pino jalpt Elmo. [monotransitive]  
 'Big Bird jalps (nonsense verb) Elmo.'
- d. [false ditransitives<sup>17</sup>]  
 De olifant jalpt de aap de giraffe. / De olifant jalpt de giraffe pie de aap.  
 'The elephant jalps (nonsense verb) the monkey the giraffe.' / 'The elephant jalps (nonsense verb) the giraffe pie (nonsense preposition) the monkey.'

In addition to these test materials, two videos were used as examples prior to the test, shown together with a monotransitive sentence (*Pino mipt Elmo*, 'Big Bird is mipping (nonsense verb) Elmo'). One example video showed Big Bird tapping Elmo with his beak (a monotransitive action). The other showed Big Bird tapping in the air, with Elmo standing at a distance (an intransitive action).

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<sup>16</sup> Some nonsense verbs were slightly adapted from Van Hout (1996).

<sup>17</sup> One of the two false ditransitive constructions was used per verb. In the case of *jalpen*, only the false double object construction appeared in the test, not the false prepositional dative construction.

Participants responded on an answer sheet, which provided instructions for them, followed by the 44 sentences in the order in which they were presented during the test. After each sentence, there were two boxes on the answer sheet, labeled “juist” (‘correct’) and “onjuist” (‘incorrect’).

#### **4.2.3. Design and analysis**

This study had a within-subjects design. As was discussed above, this experiment was analyzed using three separate analyses, which used different independent and dependent variables. For the main analysis, the independent variable was sentence type (true prepositional dative construction, true double object construction, monotransitive, false prepositional dative construction and false double object construction) and the dependent variable was the acceptance rate of the sentences as correct video descriptions by the participants.

For the analysis in which the different actions were compared, the independent variable was the action depicted in a video and, rather than acceptance rate, the dependent variable was ‘correctness of answer’. ‘Correctness of answer’ means that an answer was scored as ‘correct’ only if an intended false sentence was judged as an incorrect description, or if an intended true sentence was judged as a correct description. The reason not to use acceptance rate as the dependent variable was that each of the eleven actions, displayed in the 22 videos, was accompanied by two sentences intended as true and two sentences intended as false, resulting in 44 sentences, so an action for which all true sentences were rejected and all false sentences were accepted would not be distinguished from an action for which the true sentences were accepted and the false sentences rejected. Consequently, it would be impossible to detect any problematic actions.

In the final analysis, which compared the different role changes in the false ditransitive sentences, the independent variable was which specific arguments had their roles interchanged (the agent and the theme, the agent and the goal, or the theme and the goal), and the dependent variable was the acceptance rate of the sentences by the participants.

#### **4.2.4. Procedure**

Participation in the experiment took place in a group setting, but the answer sheets were filled out individually, and the participants were not allowed to communicate with each other during the experiment. The videos were projected on a classroom screen. The test sentences were projected above the videos as well as printed on the answer sheet.

Prior to the task, the instructions on the answer sheet were read out loud by the experimenter. The instructions said that the participants were going to watch short videos and read sentences, and that the participants’ task was to determine whether the sentences were correct or incorrect descriptions of what happened in the videos. The verbs in the sentences were said to be “from another language” and therefore could not be used as cues. The instructions stated that there were other cues to determine if a sentence was a correct description or not, but did not explicitly state what those were. After the instructions, two example videos were shown: first a monotransitive action with a monotransitive description, which was labeled as correct on the answer sheet, followed by an intransitive action with a monotransitive description, which was labeled as incorrect.

After these examples, the actual experiment started. The 22 videos displaying the eleven different actions all appeared twice (i.e., each action appeared four times), each video accompanied

once by a (true) prepositional or double object sentence and once by a monotransitive or false ditransitive sentence. The four sentence types were distributed equally over the animal and Sesame Street videos, and each verb appeared in all four constructions once.

The videos and sentences were presented in four consecutive blocks. In each block, all eleven actions occurred once, in a fixed but randomly determined order. The accompanying sentences in the different constructions were divided over the blocks at random. After each video, participants had 3-5 seconds to decide if the sentence described the video correctly and to check the appropriate box on the answer sheet. The entire procedure lasted approximately 20 minutes.

### 4.3. Results and discussion

Prior to the analyses, the mean 'correctness of answer' scores (see Design) were calculated for each participant in order to detect any outliers in the data. Note that it would be impossible to correctly detect outliers by comparing mean acceptance rates, as a participant who rejected all sentences that were intended as true and accepted all sentences that were intended as false would have the same mean acceptance rate as a participant who accepted all true sentences and rejected all false sentences. Four participants were outliers, as assessed by inspection of a boxplot, and because inclusion of these outliers negatively affected the normal distribution of the data, but did not change the outcome of the statistical tests, they were excluded from further analysis, in line with a recommendation by Grace-Martin (n.d.). This left 38 participants.

#### 4.3.1. Main analysis: sentence type effects

A repeated measures ANOVA was conducted to determine whether there was an effect of sentence type (true prepositional dative construction, true double object construction, monotransitive, false prepositional dative construction and false double object construction) on the acceptance rate of sentences as correct descriptions of ditransitive actions by adults. The mean acceptance rate for each sentence type was calculated as the proportion of participants who judged the sentences of a specific type as correct video descriptions: an acceptance rate of 0 means that all participants judged a specific sentence type as being an incorrect description of a specific video, and an acceptance rate of 1 means that all participants accepted the sentence as a correct description. For instance, if half of the participants (incorrectly) accepted the monotransitive sentence presented with the video in Figure 2 (see 61c), the acceptance rate of this sentence type for this video would be 0.5. Table 2 shows the mean acceptance rates for each sentence type (i.e., for all videos taken together), expressed as percentages.

**Table 2.** Acceptance rates, expressed as the percentage of responses in which the participants judged the sentences as correct descriptions of videos displaying ditransitive actions, for each sentence type, that is, for true and false prepositional dative constructions, true and false double object constructions, and monotransitive sentences.

Construction	Mean acceptance rate (SD)
<b>True prepositional dative construction</b>	99% (2.49)
<b>False prepositional dative construction</b>	21% (22.28)
<b>True double object construction</b>	94% (7.45)
<b>False double object construction</b>	10% (12.03)
<b>Monotransitive sentences</b>	5% (9.12)

A Shapiro-Wilk test showed that the acceptance rates were normally distributed,  $p = .237$ . Mauchly's Test of Sphericity indicated that sphericity had been violated,  $\chi^2(9) = 78.84$ ,  $p < .001$ , so the degrees of freedom were corrected using the Greenhouse-Geisser correction ( $\epsilon = .51$ ). The repeated measures ANOVA revealed a significant main effect of construction,  $F(2.04, 75.56) = 508.42$ ,  $p < .001$ . Post hoc Bonferroni tests showed that the mean acceptance rate of true prepositional dative constructions ( $M = .99$ ,  $SD = .02$ ) was higher than the acceptance rates of false prepositional dative constructions ( $M = .21$ ,  $SD = .22$ ),  $p < .001$ , true double object constructions ( $M = .94$ ,  $SD = .07$ ),  $p = .005$ , false double object constructions ( $M = .10$ ,  $SD = .12$ ),  $p < .001$ , and monotransitive sentences ( $M = .05$ ,  $SD = .09$ ),  $p < .001$ . In addition, the mean acceptance rate of true double object constructions ( $M = .94$ ,  $SD = .07$ ) was higher than the acceptance rates of false prepositional dative constructions ( $M = .21$ ,  $SD = .22$ ),  $p < .001$ , false double object constructions ( $M = .10$ ,  $SD = .12$ ),  $p < .001$ , and monotransitive sentences ( $M = .05$ ,  $SD = .09$ ),  $p < .001$ . Finally, the acceptance rate of false prepositional dative constructions ( $M = .21$ ,  $SD = .22$ ) was higher (i.e., the rejection rate was lower) than for monotransitive sentences ( $M = .05$ ,  $SD = .09$ ),  $p = .005$ .

These results show that, in the vast majority of cases, the sentences that were intended as true descriptions of the videos were accepted, and the sentences that were intended as false descriptions were rejected. This was expected if the actions in the videos were recognized as ditransitive actions with clearly recognizable agents, themes, and goals, and if the nonsense words in the sentences were interpreted as verbs and prepositions. However, the important question was if the videos were interpreted as displaying changes of possession, rather than just change of locations. The higher acceptance rate of true prepositional dative constructions than true double object constructions could be interpreted as meaning that the videos did not clearly denote changes of possession, as double object constructions cannot denote changes of location, and were therefore rejected. However, note that the acceptance rate of true double object constructions was high: 94% of true double object constructions were accepted. So, even though the participants accepted true prepositional dative constructions more accurately (99%), they accepted true double object constructions almost as often. A more plausible explanation for the difference between these sentence types is, therefore, that double object constructions are more difficult to process under time pressure than prepositional dative constructions. Specifically, the use of a preposition makes the sentence structure more transparent and gives the listener an immediate cue about which constituent is the goal. Although higher acceptance rate of false prepositional dative constructions than the monotransitive control sentences seems to counter this interpretation, this difference can be explained otherwise. Besides nonsense verbs, nonsense prepositions were used, so in some cases



false prepositional dative constructions were multi-interpretable. Specifically, if the agent and goal roles were interchanged, the sentence could be interpreted as a false sentence with a meaning like *X gave Y to Z*, but also as a true sentence with a meaning like *X received Y from Z*. This is illustrated in Figure 3, which shows stills of a video that appeared accompanied by the sentence ‘Cookie Monster troofs (nonsense verb) Big Bird jot (nonsense preposition) Elmo’. Note that, despite this ambiguity, the acceptance rate of false prepositional dative constructions was not significantly different from the acceptance rate of false double object constructions. In the remainder of this section, the results from two additional statistical tests will be discussed to investigate if there are any differences between the actions displayed in the film clips and if there is indeed an effect of which theta-roles are interchanged.



**Figure 3.** Stills from the Sesame Street video for *troven*, described as “Elmo puts Big Bird on his back and then on his feet as he makes a handstand, walks on his hands towards Cookie Monster; Cookie Monster catches Big Bird.” This video appeared in the test accompanied by the sentence *Koekiemonster trooft Pino jot Elmo* ‘Cookie Monster troofs (nonsense verb) Big Bird jot (nonsense preposition) Elmo’, which was intended as a false prepositional dative construction with a meaning like ‘Cookie Monster brings Big Bird to Elmo’, but may be interpreted as a true prepositional dative construction meaning ‘Cookie Monster received Big Bird from Elmo’ as well.

#### 4.3.2. Action effects

An additional repeated measures ANOVA was conducted to determine differences between the actions displayed in the film clips, that is, an effect of action on the acceptance or rejection rate of sentences by adults, as assessed by the ‘correctness of answer’ scores. For the example in Figure 2, a ‘correctness of answer’ score of 1 would mean that all participants thought that sentences (61a)

and (61b) were good descriptions of the corresponding videos and that sentences (61c) and (61d) were not (as they were intended). Table 3 shows the mean ‘correctness of answer’ scores for each verb (i.e., for each action), expressed as a percentage. The overall scores range from 87% correct to 97% correct. This suggests that each video clearly depicted a change of possession, confirming the conclusion from the sentence condition analysis.

**Table 3.** Mean ‘correctness of answer’ scores, expressed as the percentage of responses that was in line with how the videos were intended (i.e., acceptations of intended true sentences and rejections of intended false sentences), given for each verb (i.e., each action) separately.

Verb	Mean correctness of answer (SD)
Morken	95% (9.82)
Kwaren	94% (10.77)
Domen	96% (9.24)
Troven	88% (15.10)
Jalpen	87% (13.92)
Klepen	97% (7.78)
Prenen	96% (9.24)
Smoeken	93% (12.58)
Giepen	95% (9.82)
Plurgen	97% (8.56)
Bluren	88% (13.92)

Mauchly’s Test of Sphericity indicated that sphericity had been violated,  $\chi^2(54) = 75.81$ ,  $p = .029$ , so the degrees of freedom were corrected using the Huynh-Feldt correction ( $\epsilon = .87$ ). The repeated measures ANOVA revealed a significant effect of action,  $F(8.66, 320.30) = 4.90$ ,  $p < .001$ . A post hoc Bonferroni test showed that the mean ‘correctness of answer’ scores for three specific actions, linked to the verbs *troven*, *jalpen* and *bluren* (see Appendix B), were significantly lower than the mean scores of other actions: the mean score for *jalpen* ( $M = .87$ ,  $SD = .14$ ) was significantly lower than the mean scores for *klepen* ( $M = .97$ ,  $SD = .08$ ),  $p = .029$ , *prenen* ( $M = .96$ ,  $SD = .09$ ),  $p = .025$ , and *plurgen* ( $M = .97$ ,  $SD = .09$ ),  $p = .012$ ; the mean score for *troven* ( $M = .88$ ,  $SD = .15$ ) was significantly lower than the mean score for *klepen* ( $M = .97$ ,  $SD = .08$ ),  $p = .028$ ; and the mean score for *bluren* ( $M = .88$ ,  $SD = .14$ ) was significantly lower than the mean score for *plurgen* ( $M = .97$ ,  $SD = .09$ ),  $p = .019$ .

Closer inspection of the specific items, however, revealed that for all these three seemingly problematic actions, there was just one problematic item. One of the sentences containing *troven*, the false prepositional dative construction, was accepted by 39% of participants. Because the agent and the goal were interchanged in this sentence and because a nonsense preposition was used, this sentence became multi-interpretable (as discussed above). The same was found for the false prepositional dative construction containing *bluren*, which was accepted by 32% of people. As the other sentences containing *troven* and *bluren* had high mean scores, ranging from 0.95 to 1.0 for *troven* and from 0.87 to 1.0 for *bluren*, there seemed to be no inherent problem with these actions. Rather, the use of nonsense prepositions might be problematic in some circumstances, allowing more than one interpretation. As will also be discussed in subsection 4.3.4, the child experiments will only contain existing prepositions to prevent such ambiguity.

In addition, one of the sentences containing *jalpen*, the false double object construction, was accepted by 44% of participants. This sentence was not multi-interpretable like the other problematic sentences, but it was both the first double object construction that appeared in the test and the first false sentence. As the patient and the goal were interchanged, this double object construction had the same agent-patient-goal order as a prepositional dative construction, which may have confused some participants. Because the other sentences containing *jalpen* had high mean scores, ranging from 0.95 to 1.0, there seems to be no inherent problem with this action. However, as this problematic item occurred in the very beginning of the test, the child experiments will start with multiple practice items in order to familiarize the participants with the different sentence types (see also subsection 4.3.4).

### 4.3.3. Role interchange effects

A repeated measures ANOVA was run to determine if there was an effect of the roles which were interchanged in false ditransitive sentences on the acceptance rate. In the sentence in (61d), the roles of the theme and the goal are interchanged compared to the situation in the video displayed in Figure 2. With Figure 3, we saw an example of a sentence in which the agent and goal role were interchanged compared to the situation in the video. Third, there were test sentences in which the agent and the theme roles were interchanged. Table 4 shows the mean acceptance rate for each type of change. Overall, these acceptance rates were low, ranging from 4% to 25%, which confirms that most false sentences were correctly rejected (i.e., judged as incorrect descriptions of the videos).

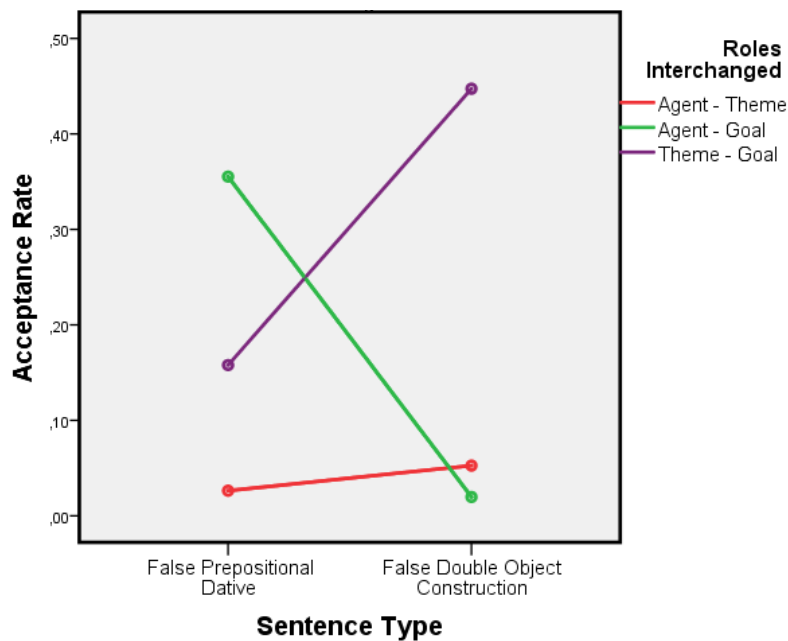
**Table 4.** Acceptance rates, expressed as the percentage of responses in which the sentences were judged as correct descriptions of videos displaying ditransitive actions, provided for all different roles that were interchanged in the false ditransitives.

Roles interchanged	Mean acceptance rate (SD)
Agent and theme	4% (13.66)
Agent and goal	13% (15.58)
Patient and goal	25% (23.80)

Mauchly's Test of Sphericity indicated that sphericity had not been violated,  $\chi^2(2) = 4.72$ ,  $p = .094$ . The repeated measures ANOVA revealed a significant effect of role change,  $F(2,74) = 15.31$ ,  $p < .001$ . Post hoc Bonferroni tests showed that the mean acceptance rate of sentences with the agent and the theme interchanged ( $M = .04$ ,  $SD = .14$ ) was significantly lower (i.e., these false sentences were more often correctly rejected) than for sentences with the agent and the goal interchanged ( $M = .13$ ,  $SD = .15$ ),  $p = .032$ , and for sentences with the patient and the goal interchanged ( $M = .25$ ,  $SD = .24$ ),  $p < .001$ . Furthermore, the acceptance rate of sentences with the agent and the goal interchanged ( $M = .13$ ,  $SD = .15$ ) was significantly lower (i.e., these false sentences were more often correctly rejected) than for sentences with the patient and the goal interchanged ( $M = .25$ ,  $SD = .24$ ),  $p < .030$ .

Further inspection of the different role changes suggested that their acceptance rates differed depending on sentence type as well, as illustrated in Figure 4. Overall, the false ditransitive sentences in which the agent and the theme were interchanged were best detected as false. This may be explained by the fact that in all sentence types used in this study the subject had to be the

agent. If another argument was used in the subject position, the falseness of the sentence was probably quite salient for most speakers. The overall higher acceptance rates of sentences in which the agent was interchanged with the goal can be explained by looking at the different sentence types (see Figure 4). Whereas the acceptance rate of double object constructions in which the agent and the goal were interchanged appears to be as low as the acceptance rate of sentences with the agent and the theme interchanged, the prepositional dative constructions with the agent and goal interchanged were multi-interpretable and could mean either something like *give to* or something like *receive from*. As a result, the acceptance rate of such sentences was rather high, close to 50% (see Figure 4). For double object constructions, the acceptance rate appeared to be higher (i.e., the rejection rate was lower) if the theme and the goal were interchanged than if the agent and the goal were interchanged. Possibly, participants applied the constituent order of prepositional dative constructions, that is, agent-theme-goal, to such sentences and therefore accepted them more often. This explanation is in line with the finding that double object constructions were, overall, more difficult to interpret correctly than prepositional dative constructions, as evidenced by the lower acceptance rate of true double object constructions than for true prepositional dative constructions (see subsection 4.3.1.)



**Figure 4.** Acceptance rates for the false sentences in which different roles were interchanged.

#### 4.3.4. Conclusion

In conclusion, the results from this adult acceptability judgment task demonstrated the validity of the materials. The actions in the videos could clearly be recognized as changes of possession, with no doubt about which puppet played the agent, theme, or recipient role. The sentences with nonsense verbs were also quite uniformly interpreted as intended, with the exception of some prepositional dative constructions. More specifically, the use of a nonsense preposition caused some sentences to be ambiguous, which influenced the effects of sentence type, action, and role interchange. To prevent this ambiguity in the child experiments, only the real

preposition *aan* 'to' will be used, which occurs in prepositional dative constructions denoting a change of location.

Furthermore, the results from this study indicated that double object constructions may be more difficult to process than prepositional dative constructions, even for adults. The lack of a preposition makes double object constructions less transparent, which may result in more confusion and mistakes when interpreting a double object construction under (time) pressure. To take away some of this confusion, in the child tests, the videos with inanimate themes will be used as practice items, together with sentences familiarizing the children with the different constructions used in the test. However, double object constructions can be expected to remain more difficult to interpret than prepositional dative constructions.

Finally, although there were differences in rejection rates depending on which roles were interchanged in the false ditransitives, in the child tests, all three possible role changes will be used in false sentences. Overall, the rejection rates of false ditransitives were high in this study, regardless of which roles were interchanged. Moreover, the differences between the role changes are expected to be smaller when real prepositions are used, as will be the case in the child tests. In addition, if only one type of role change were used, participants could be expected to note this regularity and not pay close attention to each character and each argument when judging a sentence as a correct or incorrect description of a video.

## 5. Study 3a: Learning from the double object construction

### 5.1. Research question

This study, which took the form of a truth value judgment task, addressed multiple sub-questions for Dutch. It investigated the age of acquisition of both active and passive dative alternation (sub-question 1 and 4), and how Dutch children use both active and passive dative alternation (that is, whether they use the dative alternation rules productively, as was found for English-speaking children generalizing the active dative alternation rules) (sub-question 2 and 5). Finally, a comparison of this study and the study discussed in the next section (see subsection 6.5) addresses sub-question 6 for Dutch: *How conservative are children in the alternations that they allow for newly acquired ditransitive verbs?*

### 5.2. Materials and method

#### 5.2.1. Participants

The participants were 32 children (9 boys, 23 girls) aged between 6 and 10 years ( $M = 8.16$ ,  $SD = 1.07$ ), recruited through elementary schools De Touw ladder in IJsselstein and De Kaardebol in Culemborg, two towns not very far from the city of Utrecht. Informed consent was obtained from the parents or caretakers of all participants.

#### 5.2.2. Materials

The materials consisted of the 22 videos that were pretested in study 2 (eleven different actions, each once performed by animals and once by Sesame Street characters) and 30 different

spoken sentences. The same eleven nonsense verbs from study 2 were used (see Appendix B). Each verb appeared in a double object construction with the descriptions of the animal puppets as arguments. These eleven animal sentences, together with the eleven animal videos, were used to teach the children the novel verbs. The fact that these sentences were all double object constructions ensured that the actions would be interpreted as changes of possession. In addition, there were 19 sentences involving the Sesame Street characters as arguments, which formed the test sentences, of which 16 described the eight puppet-only videos and three sentences described the remaining three videos, which involved both animate puppets and inanimate objects. These 19 test sentences occurred in four different constructions: active prepositional dative constructions (see 62), active double object constructions (see 63), direct object passives (with a preposition introducing the indirect object) (see 64) and *him*-constructions (see 65).<sup>18</sup>

- (62) [prepositional dative construction]  
Pino jalpte Koekiemonster aan Elmo.  
Pino jalped (nonsense verb) Koekiemonster to Elmo  
‘Big Bird jalped Cookie Monster to Elmo.’
- (63) [double object construction]  
Pino jalpte Elmo Koekiemonster.  
Pino jalped (nonsense verb) Elmo Koekiemonster.  
‘Big Bird jalped Elmo Cookie Monster.’
- (64) [direct object passive]  
Koekiemonster werd door Pino aan Elmo gejalpt.  
Koekiemonster became by Pino to Elmo jalped (nonsense verb)  
‘Cookie Monster was jalped to Elmo by Big Bird.’
- (65) [*him*-construction]  
Elmo werd door Pino Koekiemonster gejalpt.  
Elmo became by Pino Koekiemonster jalped (nonsense verb)  
‘Elmo was jalped Cookie Monster by Big Bird.’

Each of the eight novel verbs describing a puppet-only action appeared in two of these constructions, once in one of the active constructions and once in one of the passives. Of these two sentences, one provided a true description of a video and the other sentence was false. As in study 2, false sentences did describe the action displayed in the video, but the roles of two puppets were interchanged. For instance, a false version of (62) would be *Koekiemonster jalpt Pino aan Elmo* ‘Cookie Monster jalps Big Bird to Elmo’. Table 5 shows how the specific active and passive constructions were divided over the Sesame Street videos. Each construction appeared four times in total: twice as a true sentence and twice as a false sentence.

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<sup>18</sup> Dutch indirect object passives can be used only in very specific contexts, with specific verbs and non-nominal direct objects. For better comparability with the other constructions and for better comparability with English indirect object passives (see section 7), *him*-constructions were therefore used here as the prepositionless ditransitive passives of passive dative alternation, rather than (grammatical) indirect object passives. Future studies should address the acquisition of indirect object passives in Dutch.

**Table 5.** Distribution of experimental sentence types over the actions displayed in videos (see also Appendix B for descriptions of the actions denoted by the verbs).

Construction	true/false	action (denoted by verb)
<b>Active double object construction</b>	true	<i>smoeken</i> and <i>jalpen</i>
<b>Active double object construction</b>	false	<i>kwaren</i> and <i>domen</i>
<b>Active prepositional dative construction</b>	true	<i>prenen</i> and <i>klepen</i>
<b>Active prepositional dative construction</b>	false	<i>troven</i> and <i>morken</i>
<b>Prepositional direct object passive</b>	true	<i>morken</i> and <i>troven</i>
<b>Prepositional direct object passive</b>	false	<i>klepen</i> and <i>prenen</i>
<b>Him-construction</b>	true	<i>domen</i> and <i>kwaren</i>
<b>Him-construction</b>	false	<i>jalpen</i> and <i>smoeken</i>

Besides the eight puppet-only actions, there were three actions with inanimate objects rather than animate entities as themes. The videos displaying these actions were used as practice items (see section 5.2.4 for procedure). The sentences describing the animal videos with these actions were double object constructions, as were the rest of the animal sentences, and the sentences describing the Sesame Street sentences consisted of one true active double object dative, one true prepositional direct object passive and one false *him*-construction. These different constructions were chosen in order to familiarize the children with both prepositional and prepositionless active and passive sentences.

During the test, a bird puppet was used to utter the test sentences to the children. This bird was clearly distinct from the puppets used in the videos.

### 5.2.3. Design

The experiment used a 4x2 within-subjects design. The independent variables were construction (the test sentences consisted of active double object constructions, active prepositional dative constructions, prepositional direct object passives, and *him*-constructions) and trueness (the test sentences were constructed as either true or false descriptions of the videos). The dependent variable was the acceptance rate of the sentences as good video descriptions by the children.

### 5.2.4. Procedure

The children were individually tested by two experimenters, one of them interacting with the children and playing the bird puppet, the other writing down the children's responses. The children were told that the bird puppet, named Flip, thought that he was so smart that he knew everything. Although the experimenter hinted at not really believing Flip, in order to avoid strong yes-biases in the children's responses, she asked the child to help her find out how smart Flip really was. The child and the experimenter blindfolded Flip together to make sure that he could not see what was going on. Then the experimenter explained that they were going to watch some videos in which puppets would be "doing all kinds of crazy things" and that the child was going to hear some words they would not know, but that the experimenter would help them figure out what those meant (i.e., the experimenter would utter the animal sentences, teaching the child the novel verbs). The experimenter explained that the child would then see another video, for which Flip would try to tell

what was going on, even though he could not see. The child was instructed to pay close attention to both Flip's utterances and to who was doing what in the videos, so that they could say if Flip described the videos correctly or not and if he was as smart as he claimed he was (i.e., they would perform a truth value judgment task).

During the test (including the practice phase), the videos were shown in pairs consisting of one video of the animal puppets performing an action and one video of the Sesame Street character puppets performing the same action. From this point on, the word 'item' is used to indicate a pair of videos together with the accompanying sentences. To practice judging sentences with novel verbs and videos with non-existing actions, and to become familiar with both active and passive prepositional and prepositionless video descriptions, the task started with the three practice items, which involved the videos with inanimate themes. The procedure was the same for each item, including both the practice items and the test items. First, the video was shown in which the animals performed an action. While this video was playing, showing the same action three times, the experimenter taught the child the corresponding nonsense verb by saying something like: "What do we see here?", and then uttering the double object animal sentence. Next, the video was played in which the Sesame Street characters performed the same action, again shown three times. After the Sesame Street video, the bird puppet Flip (played and voiced by the experimenter) uttered a true or false experimental sentence. In order to make the use of especially passive test sentences more felicitous, before uttering a test sentence, Flip would make some 'thinking noises', mentioning the characters' names in a specific order. The character mentioned last, which thereby became the topic, could then be plausibly used in the subject position of the test sentence. For example, Flip would say something like: "Umm... Okay, I think there's... Big Bird... and Elmo... and... Cookie Monster... I know! Cookie Monster was *jalped* to Elmo by Big Bird." Then, the experimenter asked the child if Flip was right or wrong. If a child was unsure, the test sentence would be repeated and, if necessary, the videos were replayed as well. After the three practice items were conducted in this way, the test phase started. In this phase, the eight puppet-only video pairs were shown. Each pair appeared twice in the test, accompanied by different test sentences (see Table 5), resulting in sixteen test items. The procedure in the test phase was the same as the procedure described above for the practice phase. The task lasted approximately 15 minutes per child.

### 5.3. Results

A repeated measures ANOVA was conducted to determine effects of construction (prepositional dative construction, double object construction, prepositional direct object passive and *him*-construction) and/or trueness (true or false sentences) on the acceptance rate of the sentences by the children. Acceptance rate for each sentence type (i.e., for the true and false sentences in the four different constructions) was expressed as the proportion of participants who judged the sentences of that type as 'right'. There were no outliers, as assessed by inspection of a boxplot. However, three children were removed from further analysis because their behavior during the experiment suggested they did not understand the task. This left 29 participants. Table 6 displays the mean acceptance rates by these 29 participants for each sentence type, expressed as a percentage rather than a proportion for clearer interpretability.

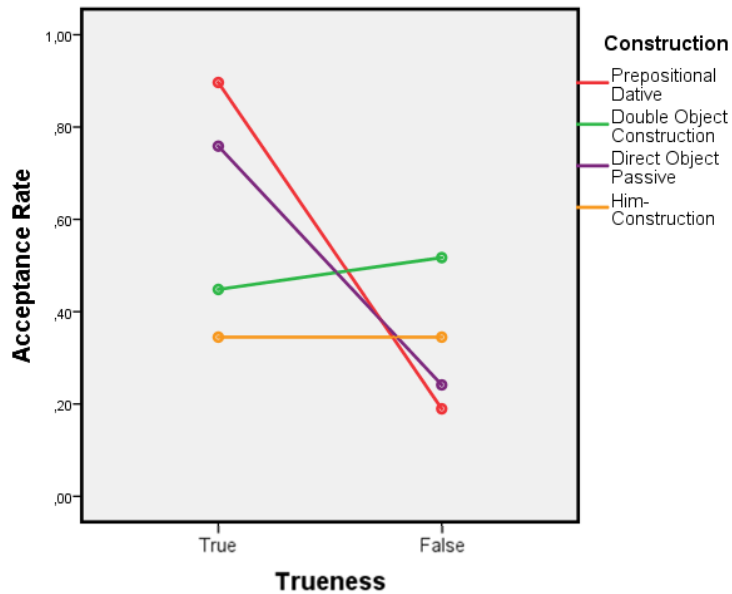


**Table 6.** Acceptance rates, expressed as the percentage of responses in which the children judged the sentences as ‘right’ (i.e., as correct video descriptions), given for each sentence type (i.e., true and false prepositional dative constructions, double object constructions, prepositional direct object constructions, and *him*-constructions).

Construction	Trueness	Mean acceptance rate (SD)
Active double object construction	True	90% (20.61)
Active double object construction	False	19% (28.07)
Active prepositional dative construction	True	45% (42.98)
Active prepositional dative construction	False	52% (31.29)
Prepositional direct object passive	True	76% (28.73)
Prepositional direct object passive	False	24% (34.38)
<i>Him</i> -construction	True	35% (40.32)
<i>Him</i> -construction	False	35% (40.32)

A Shapiro-Wilk test showed that the acceptance rates were normally distributed ( $p = .203$ ). Mauchly’s Test of Sphericity indicated that sphericity had not been violated for construction,  $\chi^2(5) = 9.85$ ,  $p = .080$ , and the interaction between construction and trueness,  $\chi^2(5) = 9.37$ ,  $p = .095$ . For trueness, sphericity was assumed, as this factor consisted of only two levels. The repeated measures ANOVA revealed a significant main effect of construction,  $F(3,84) = 4.51$ ,  $p = .006$ , a significant main effect of trueness,  $F(1,28) = 40.81$ ,  $p < .001$ , and a significant interaction effect of construction and trueness,  $F(3,84) = 18.52$ ,  $p < .001$ . Post hoc Bonferroni tests showed that the mean acceptance rate of *him*-constructions ( $M = .35$ ,  $SD = .40$ ) was significantly lower than the mean acceptance rate of prepositional dative constructions ( $M = .54$ ,  $SD = .43$ ),  $p = .013$ . The mean acceptance rates of double object constructions ( $M = .48$ ,  $SD = .37$ ) and direct object passives ( $M = .50$ ,  $SD = .41$ ) did not significantly differ from the acceptance rates of any other constructions. Furthermore, as expected, true sentences ( $M = .61$ ,  $SD = .41$ ) were significantly more often accepted as true than false sentences ( $M = .32$ ,  $SD = .36$ ),  $p < .001$ .

The interaction effect, illustrated in Figure 5, was further investigated through simple main effects analysis. In true sentences, the acceptance rate of prepositional dative constructions was significantly higher than the acceptance rate of double object constructions ( $p = .001$ ) and the acceptance rate of *him*-constructions ( $p < .001$ ). The acceptance rate of direct object passives was significantly higher than the acceptance rate of double object constructions ( $p = .027$ ) and *him*-constructions ( $p < .001$ ) as well. In false sentences, the acceptance rate of double object constructions was significantly higher (i.e., the rejection rate was lower) than for prepositional dative constructions ( $p < .001$ ) and direct object passives ( $p = .002$ ). Furthermore, for both prepositional dative constructions ( $p < .001$ ) and direct object passives ( $p < .001$ ), true sentences were accepted more often than false sentences, whereas for both double object constructions ( $p = .475$ ) and *him*-constructions ( $p = .999$ ), there were no differences in the acceptance rate of true and false sentences.



**Figure 5.** Interaction between construction and trueness. For true sentences, the acceptance rates of prepositional dative constructions and prepositional direct object passives were significantly higher than the acceptance rates of double object constructions and *him*-constructions. For false sentences, the acceptance rate of double object constructions was significantly higher than the acceptance rates of prepositional dative constructions and direct object passives (i.e., the rejection rate was lower). For both prepositional dative constructions and prepositional direct object constructions, the acceptance rates of true sentences were higher than for false sentences, but for double object constructions and *him*-constructions the acceptance rates of true sentences did not differ from the acceptance rates of false sentences.

Because several sentence types, specifically the prepositionless constructions, had mean acceptance rates around 0.5, children's individual responses were more closely inspected in order to find out if these acceptance rates were due to strong variation between children (e.g., half of the children accepting these sentence types and half rejecting them) or due to variation within children (e.g., each child accepting half of the sentences of a certain type and rejecting the other half). The latter can be interpreted as the children being uncertain how to interpret these sentence types. Table 7 contains the mean acceptance rate for each sentence type, as well as the percentage of children who either accepted all sentences, accepted one and rejected one, or rejected all sentences. For prepositional dative constructions, the children appeared quite certain, most of them accepting all true sentences and rejecting all false sentences. The same is largely true for direct object passives, although a relatively large percentage of children was uncertain about true direct object passives. For double object constructions, there was a difference between the true and false sentences as well. Whereas most children were uncertain about false double object constructions, there was more variation between children's judgments of true double object constructions, resulting in comparable acceptance rates for the two sentence types. Finally, whereas *him*-constructions were mostly rejected, there was some variation between children as well. Despite the differences between sentence types, however, it is clear that the variation between children was never so strong that, for instance, half of the children accepted all sentences and half rejected them all, resulting in an acceptance rate of approximately 0.5. Instead, in conditions with such acceptance rates, many children were uncertain as well.

**Table 7.** The percentage of participants who either accepted both sentences of a sentence type, accepted one and rejected one, or rejected both sentences, given for each sentence type. Mean acceptance rates (see Table 6) are repeated here for comparison.

	Accept all	Accept/reject 50/50	Reject all	Mean acceptance rate
<b>True prepositional dative constructions</b>	79%	21%	0%	90%
<b>False prepositional dative constructions</b>	3%	31%	66%	19%
<b>True double object constructions</b>	31%	28%	41%	45%
<b>False double object constructions</b>	21%	62%	17%	52%
<b>True direct object passives</b>	55%	41%	3%	76%
<b>False direct object passives</b>	10%	28%	62%	24%
<b>True <i>him</i>-constructions</b>	21%	28%	52%	35%
<b>False <i>him</i>-constructions</b>	21%	28%	52%	35%

#### 5.4. Discussion

The results of study 3a show that, when Dutch children between the ages of 6 and 10 learn novel verbs by hearing them in double object constructions, there are clear differences in how they judge different sentence types as descriptions of videos displaying a change of possession. Overall, sentences that were intended as true were more often accepted as good video descriptions than sentences in which the roles of two arguments were interchanged (i.e., intended false sentences), but this was not the case for each separate construction. True prepositional dative constructions and true prepositional direct object passives were more often accepted than, respectively, false prepositional dative constructions and false prepositional direct object passives, but for double object constructions and *him*-constructions, false sentences were accepted equally often as the true sentences, a result of both uncertainty within children and some variation between children. Moreover, both true prepositional dative constructions and true direct object passives were more often accepted than true double object constructions and true *him*-constructions. False double object constructions were rejected less often than false prepositional dative constructions and false direct object passives. Finally, *him*-constructions were more often rejected than prepositional dative constructions, regardless of trueness.

In other words, despite learning novel verbs in a prepositionless construction, the children judged both active and passive constructions with prepositions much more accurately than both active and passive prepositionless constructions. Prepositionless passives (i.e., *him*-constructions) were mostly rejected, whether they were true or false, which suggests that the combination of

passive voice and the lack of a preposition caused these sentences not to make enough sense to the children to be considered acceptable. The finding that prepositionless constructions are more difficult to interpret than prepositional constructions is in line with the findings from the adult pretest (see subsection 4.3.4). However, it is surprising that children can learn novel verbs from prepositionless constructions, but cannot accurately judge such constructions, as evidenced by the similar acceptance rates of both true and false prepositionless constructions. Before the research questions addressed in this study can be (partly) answered in subsection 6.5, the next section will discuss study 3b, a replication of this study, with the difference that the children learned novel verbs from prepositional dative constructions instead of double object constructions.

## 6. Study 3b: Learning from the prepositional dative construction

### 6.1. Research question

This study addressed the same sub-questions for Dutch as study 3a: it addressed the age of acquisition of both active and passive dative alternation (sub-question 1 and 4), and how (productively) Dutch children use both active and passive dative alternation (sub-question 2 and 5). A comparison of this study and study 3a (see section 6.5) can answer sub-question 6 for Dutch: *How conservative are children in the alternations that they allow for newly acquired ditransitive verbs?*

### 6.2. Materials and method

#### 6.2.1. Participants

The participants were 29 children (12 boys, 17 girls) from 6 to 10 years old ( $M = 8.35$ ,  $SD = 1.03$ ), recruited through elementary school De Kaardebol in Culemborg. These were different children than the children who participated in study 3a. Informed consent was obtained from the parents or caretakers of all participants.

#### 6.2.2. Materials

The video materials in this study were identical to the materials in study 3a. The test sentences were similar to those used in study 3a, but with some important differences. Instead of double object constructions, all the sentences involving animals, which were used to teach the children the novel verbs, were prepositional dative constructions. This includes the sentences used to teach the children the verbs used in the practice items. These sentences were all *aan*-datives to make sure that the actions would again be interpreted as changes of possession. Besides the animal sentences, one of the Sesame Street sentences was altered as well: in the practice items, instead of a true double object construction, a true prepositional dative construction was used. The test sentences used in the test phase were identical to those of study 3a.

#### 6.2.3. Design

The design of study 3b is identical to the design of study 3a: a 4x2 within-subjects design with construction and trueness of the test sentences as independent variables and the acceptance rate of the sentences as good video descriptions by the children as the dependent variable.

#### 6.2.4. Procedure

The procedure was the same as in study 3a.

#### 6.3. Results

A repeated measures ANOVA was conducted to determine if there were effects of construction (prepositional dative construction, double object construction, prepositional direct object passive and *him*-construction) and/or trueness (true or false sentences) on acceptance rate of sentences by children. Acceptance rate for each sentence type (i.e., for the true and false sentences in the four different constructions) was expressed as the proportion of participants who judged the sentences of that type as 'right'. There were no outliers, as assessed by inspection of a boxplot. However, three children were removed from further analysis because their behavior during the experiment suggested they did not understand the task. This left 26 participants. Table 8 displays the mean acceptance rate for each sentence type, expressed as a percentage.

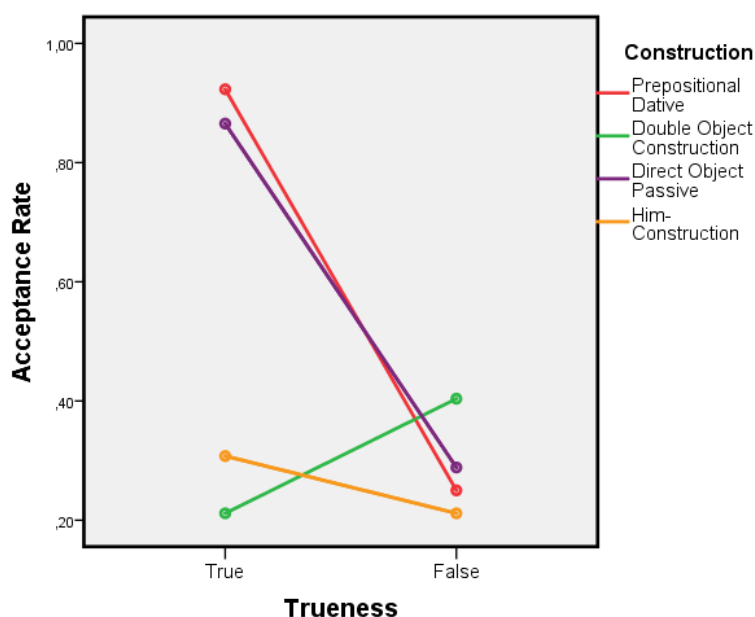
**Table 8.** Acceptance rates, expressed as the percentage of responses in which the children judged the sentences as 'right' (i.e., correct video descriptions), given for each sentence type (i.e., true and false prepositional dative constructions, double object constructions, prepositional direct object constructions, and *him*-constructions.)

Construction	Trueness	Mean acceptance rate (SD)
Active double object construction	True	92% (23.21)
Active double object construction	False	25% (38.08)
Active prepositional dative construction	True	21% (32.17)
Active prepositional dative construction	False	40% (24.57)
Prepositional direct object passive	True	87% (22.62)
Prepositional direct object passive	False	29% (35.14)
<i>Him</i> -construction	True	31% (37.62)
<i>Him</i> -construction	False	21% (32.17)

Mauchly's Test of Sphericity indicated that sphericity had been violated for construction,  $\chi^2(5) = 12.81$ ,  $p = .025$ , but not for the interaction between construction and trueness,  $\chi^2(5) = 3.08$ ,  $p = .687$ . For trueness, sphericity was assumed, as this factor consisted of only two levels. Because Mauchly's test indicated that the assumption of sphericity had been violated for construction, the degrees of freedom were corrected using the Huynh-Feldt correction ( $\epsilon = .76$ ). The results showed a significant main effect of construction,  $F(2.50, 62.54) = 14.40$ ,  $p < .001$ . Furthermore, the repeated measures ANOVA revealed a significant main effect of trueness,  $F(1, 25) = 48.39$ ,  $p < .001$ , and a significant interaction effect between construction and trueness,  $F(3, 75) = 27.28$ ,  $p < .001$ . Post hoc Bonferroni tests showed that the mean acceptance rate of prepositional dative constructions ( $M = .59$ ,  $SD = .46$ ) was significantly higher than the mean acceptance rates of double object constructions ( $M = .31$ ,  $SD = .30$ ),  $p = .004$ , and *him*-constructions ( $M = .26$ ,  $SD = .35$ ),  $p = .003$ . The mean acceptance rate of prepositional direct object passives ( $M = .58$ ,  $SD = .41$ ) was significantly higher than the mean acceptance rates of double object constructions ( $M = .31$ ,  $SD = .30$ ),  $p = .002$ , and *him*-constructions ( $M = 0.26$ ,  $SD = 0.35$ ),  $p < .001$ , as well. As expected, true sentences ( $M = .58$ ,

$SD = .43$ ) were significantly more often accepted as true than false sentences ( $M = .29$ ,  $SD = .33$ ),  $p < .001$ .

Regarding the interaction effect, illustrated in Figure 6, simple main effect analysis showed that, in true sentences, the acceptance rate of prepositional dative constructions was significantly higher than the acceptance rate of double object constructions ( $p < .001$ ) and *him*-constructions ( $p < .001$ ), and that the acceptance rate of direct object passives was significantly higher than the acceptance rate of double object constructions ( $p < .001$ ) and *him*-constructions ( $p < .001$ ). In false sentences, however, there were no significant differences between the acceptance rates of any of the constructions. For both prepositional dative constructions ( $p < .001$ ) and prepositional direct object passives ( $p < .001$ ), true sentences were accepted more often than false sentences, whereas for *him*-constructions ( $p = .203$ ), there were no differences in the acceptance rate of true and false sentences. Furthermore, false double object constructions were accepted significantly more often than true double object constructions ( $p = .009$ ).



**Figure 6.** Interaction between construction and trueness. For true sentences, the acceptance rates of prepositional dative constructions and prepositional direct object passives were significantly higher than the acceptance rates of double object constructions and *him*-constructions. For false sentences, the acceptance rates did not differ between the constructions. For both prepositional dative constructions and direct object constructions, the acceptance rates of true sentences were higher than for false sentences, but for double object constructions the acceptance rate of false sentences was higher than the acceptance rate of true sentences (i.e., the rejection rate was lower), and for *him*-constructions, the acceptance rates of true sentences did not differ from the acceptance rates of false sentences.

Table 9 below contains more information on variation between and within children's responses in the different conditions. As in study 3a, children appeared relatively certain when judging prepositional dative constructions, most of them accepting all true sentences and rejecting all false sentences. The same is mostly true for direct object passives, although a relatively large percentage of children was unsure about false direct object passives, accepting only one of the two sentences. Whereas most children appear to have been uncertain about the interpretation of false double object constructions, most children rejected all true double object constructions. Finally,

whereas *him*-constructions were mostly rejected, a relatively large percentage of children rejected only one of the false sentences, whereas there was more variation between children for true *him*-constructions. As in study 3a, despite the differences between sentence types, it is clear that the variation between children was never so strong that, for instance, half of the children accepted all sentences and half rejected them all, which would result in an acceptance rate of approximately 0.5. Rather, in conditions with such acceptance rates, many children were uncertain as well.

**Table 9.** The percentage of participants who either accepted both sentences of a sentence type, accepted one and rejected one, or rejected both sentences, provided for each sentence type. Mean acceptance rates (see Table 8) are repeated here as well.

	Accept all	Accept/reject 50/50	Reject all	Mean acceptance rate
<b>True prepositional dative constructions</b>	89%	8%	4%	92%
<b>False prepositional dative constructions</b>	15%	19%	65%	25%
<b>True double object constructions</b>	8%	27%	65%	21%
<b>False double object constructions</b>	4%	73%	23%	40%
<b>True direct object passives</b>	73%	27%	0%	87%
<b>False direct object passives</b>	12%	35%	54%	29%
<b>True <i>him</i>-constructions</b>	15%	31%	54%	31%
<b>False <i>him</i>-constructions</b>	8%	27%	65%	21%

#### 6.4. Discussion

The results of study 3b show that, when Dutch children between the ages of 6 and 10 learn novel verbs in the prepositional dative construction, their judgments of different sentence types as good or bad descriptions of videos displaying a change of possession differ, as was the case in study 3a. Overall, true sentences were accepted as good descriptions more often than false sentence, but this was only the case for prepositional dative constructions and prepositional direct object passives. False *him*-constructions were accepted equally often as true *him*-constructions, a result of both children's uncertainty and some variation between children. Children appeared to be quite uncertain about double object constructions, which they even accepted more often than true double object constructions, which were rejected in most cases. Furthermore, true prepositional dative constructions were more often accepted than true double object constructions and true *him*-constructions, and true direct object passives were accepted more often than true double object constructions. In contrast, there were no such differences in acceptance rate between the four constructions when only false sentences were considered. Finally, both double object constructions

and *him*-constructions were rejected more often than prepositional dative constructions and direct object passives, regardless of trueness.

These results show that the children who learned novel verbs in prepositional constructions judged both active and passive prepositional constructions more accurately than prepositionless constructions, and mostly rejected prepositionless constructions. The finding that false double object constructions were accepted more often than true double object constructions is somewhat surprising. A possible explanation may be that children interpreted double object constructions as having the same agent-patient-goal argument order as prepositional dative constructions and therefore accepted double object constructions when the theme and goal arguments were interchanged (see also study 2 in section 4). The higher acceptance rate of true prepositional constructions than true prepositionless constructions is in line with the findings from study 2, which showed that prepositionless constructions are more difficult to interpret than prepositional constructions. In the next subsection, the similarities and differences between the results from studies 3a and 3b will be discussed and interpreted, and the research questions addressed in these studies will be answered.

### 6.5. Comparative discussion study 3a and study 3b

The similarities between the results from study 3a and study 3b are striking: independently of the construction in which the children learned the novel verbs, (i.e., whether the novel verbs were taught in a prepositional or a prepositionless construction), they more accurately accepted and rejected both active and passive prepositional constructions. Interestingly, when only the results from study 3b are considered, it seems like Dutch children aged 6-10 have not yet acquired active nor passive dative alternation and are very conservative. That is, if they learn a verb in a prepositional dative construction, they only accept it in prepositional constructions, despite the fact that hearing a verb in an *aan*-construction almost always means that it is an alternating verb. However, study 3a showed that the children were capable of extracting the meaning of a double object construction, as they could accurately judge the trueness of prepositional constructions using the same verbs, but that they could not accurately judge prepositionless constructions. So, because the children correctly accepted almost all true prepositional constructions after learning the verbs these constructions contained in prepositionless constructions, it appears that, between the ages of 6 and 10, Dutch children have acquired at least some aspects of both active and passive dative alternation (sub-questions 1 and 4), and that they apply the rules they have formed to newly acquired verbs (sub-questions 2 and 5).

The finding that the children could not correctly judge prepositionless construction in either study may be explained by the notion of transparency (see subsection 4.3). If an argument of a ditransitive sentence is introduced by a preposition, there is no doubt about which role that argument has: only goals can directly follow prepositions like *aan* in ditransitive sentences. The agent in both active and passive sentences denoting transfer is always easily identified, as it is either in subject position (in active sentences) or introduced by the preposition *door* 'by' (in passive sentences). As Dutch children aged 6-10 have no problem interpreting monotransitive passives (see Koutamanis, 2015), they know that *door* 'by' can introduce an agent. In prepositional ditransitive sentences, the theme is the only argument without such a direct cue, which makes it easy to identify as well. In prepositionless sentences, however, only the subject can be so easily detected, and the



theme and the goal must be distinguished based on word order alone. The results of study 3b particularly show that this is not an easy task for a child (or even for an adult, as was demonstrated in study 2).

The children in study 3b accepted false double object constructions more often than true double object constructions. These children received more input in the form of prepositional dative constructions than the children in study 3a. If they indeed have trouble distinguishing the theme from the goal in prepositionless sentences, they may have applied the agent-theme-goal order from prepositional dative constructions to double object constructions as a default option. This could have resulted in incorrect acceptance of double object constructions in which the theme and the goal were interchanged. Study 3a, however, did not show a difference between the acceptance rates of true and false double object construction. This suggests that the children who had less exposure to prepositional dative constructions applied the agent-theme-goal order less often. So, despite the similarities between the results from the two studies, they show a clear effect of the construction in which the novel verbs were learned.

Another difference is that study 3b, unlike study 3a, showed no difference between the acceptance rates of all false sentence types: they were all mostly rejected. If only the false sentences are considered, it seems like the children in study 3b judged prepositionless constructions more accurately than the children who participated in study 3a. This conclusion would be surprising given that the children in study 3a had more exposure to prepositionless constructions than the children in study 3b. However, in study 3b, true prepositionless constructions were rejected as often as false prepositionless constructions. This suggests that children with less exposure to prepositionless constructions were actually more conservative than children with more exposure to these constructions, rejecting them regardless of their truthfulness.

Although these studies contribute to answering several questions for Dutch, little is known about how English-speaking children acquire passive dative alternation. Therefore, the following section contains a research proposal to answer these same questions for English, providing a way to compare Dutch and English acquisition patterns and, ultimately, to contribute to our understanding of children's language acquisition and the learnability problem.

## 7. Studies 4a and 4b: research proposal

### 7.1. Research question

Studies 4a and 4b are replications of studies 3a and 3b, respectively, with English-speaking children as participants. Studies 4a and 4b aim to answer sub-question 4 (the age of acquisition of passive dative alternation) and 5 (how [productively] English children use passive dative alternation).<sup>19</sup> Moreover, like studies 3a and 3b for Dutch, a comparison of studies 4a and 4b can answer sub-question 6 (children's conservativeness in allowing alternations for newly acquired ditransitive verbs)

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<sup>19</sup> Studies 3a and 3b were also aimed at answering sub-question 1 and 2. Although these questions have already been answered for English in the literature, the studies proposed here can confirm the conclusions from previous research.

for English. Unlike studies 3a and 3b, studies 4a and 4b have not been conducted yet, but are proposed here as future experiments

## 7.2. Materials and method

### 7.2.1. Participants

The desired participants for both study 4a and study 4b are English-speaking children aged from 6 to 10 years old, so that they can be compared to the Dutch-speaking children aged from 6 to 10 years old tested in study 3a and study 3b.

### 7.2.2. Materials

The materials are similar to those used in studies 3a and 3b. The same 22 videos will be used, displaying eleven different ditransitive actions for which no English words exist, performed once by animal puppets and once by Sesame Street characters. Three of the actions, which have inanimate objects as themes, are used as practice items. In the remaining eight actions, which are used as test items, all three roles are fulfilled by animate puppets. The sentences contain monosyllabic, native-like novel verbs, taken from Pinker, Lebeaux & Frost (1987), Gropen et al. (1989), and Brooks and Tomasello (1999) (see Appendix B). In study 4a (as in study 3a), the sentences describing the animal videos, which are used to teach the children the novel verbs, are double object constructions. In study 4b (as in study 3b), these animal sentences are prepositional dative constructions. The test sentences, which all describe the Sesame Street videos, are identical in both studies and occur in four different constructions: prepositional dative constructions (see 66), double object constructions (see 67), direct object passives (see 68) and indirect object passives (see 69).

(66)	Elmo norped Cookie Monster to Big Bird.	[prepositional dative construction]
(67)	Elmo norped Big Bird Cookie Monster.	[double object construction]
(68)	Cookie Monster was norped to Big Bird by Elmo.	[direct object passive]
(69)	Big Bird was norped Cookie Monster by Elmo.	[indirect object passive]

The distribution of constructions over actions is the same as in studies 3a and 3b (with the indirect object passive as the English counterpart of the Dutch *him*-construction), so that each construction appears twice as a true sentence, of which one is active and one passive, and twice as a false sentence, again one active and one passive. For the three practice items, which have inanimate themes, one test sentence is either a true active double object construction (in study 4a) or a true active prepositional dative construction (in study 4b), one is a false indirect object passive and one is a true direct object passive.

During the test, a puppet similar to the bird puppet used in studies 3a and study 3b will be used to present the test sentences to the children.

### 7.2.3. Design

Both experiments use a 4x2 within-subjects design. The independent variables are ‘construction’ (the test sentences are active double object constructions, active prepositional dative

constructions, direct object passives and indirect object passives), and ‘trueness’ (the test sentences are either true or false). The dependent variable is the acceptance rate of the sentences as good video descriptions by the children.

#### **7.2.4. Procedure**

The procedures of studies 4a and 4b are identical to the procedures of studies 3a and 3b, respectively. First, the experimenter introduces the child to a puppet who thinks he is so smart that he knows everything, who is then blindfolded. During the test, the experimenter teaches the child novel verbs by describing the animal video of particular actions. In study 4a, these descriptions have the form of a double object construction, and in study 4b they are prepositional dative constructions. After each animal video, a video is shown in which Sesame Street characters perform the same action. The blindfolded puppet gives a description of the Sesame Street video and the child is asked to accept or reject this description, with the goal to find out if the puppet is as smart as he says he is. This procedure is repeated for all items, both practice items and test items.

### **7.3. Expected results**

As was discussed in sections 2 and 3, English-speaking children are expected to acquire active dative alternation later than Dutch children, but to acquire passive dative alternation earlier. As a consequence, between the ages of 6 and 10, English-speaking children are expected to perform better on the ditransitive passives than Dutch children, that is, to more accurately accept true ditransitive passives and reject false ditransitive passives. As these studies only contain native-like verbs, if the desired participants have not yet acquired the morphophonological constraint, this is not expected to hinder their performance. In English, as in Dutch, prepositional constructions are more transparent than prepositionless construction, so it is possible that English-speaking children will more accurately judge prepositionless constructions, as did the Dutch children in studies 3a and 3b. However, because English-speaking children’s acquisition of ditransitive passives is predicted to precede Dutch children’s acquisition, this effect may be less pronounced than in studies 3a and 3b.

## **8. Discussion**

Studying the acquisition of ditransitive sentences can shed light on the general learnability of language. However, previous literature that addressed the phenomenon of dative alternation mostly focused on the acquisition of active ditransitive constructions by English-speaking children, but not on other languages and other constructions, such as passives. English active dative alternation poses an extensively studied learnability problem. Many transference ditransitive verbs, but not all, can be optionally used in both the prepositional dative construction and the double object construction, which are semantically very similar. Most verbs that do not alternate are only allowed in prepositional dative constructions. Consequently, if a child has never heard a specific verb in the double object construction, this could mean that this verb does not alternate, or it may simply be a coincidence that speakers have not used it in the double object construction around the child. Despite this, all children eventually learn which verbs alternate and which do not. Over the last decades, multiple possible solutions to this problem have been proposed (see sub-questions 1 and 2 below). However, little attention has been given to the acquisition of passive dative alternation (i.e.,

the alternation between direct and indirect object passives), which poses the same learnability questions but is not necessarily acquired in the same way (see sub-question 3-5 below). Moreover, no previous studies have addressed the acquisition of ditransitive constructions in Dutch, both active (see sub-questions 1 and 2) and passive (see sub-questions 4 and 5). Although Dutch dative alternation is fairly similar to English dative alternation, there are crucial differences, leading to different predictions regarding acquisition (see sub-question 3), which this thesis aimed to test. The main aim of this study was to answer the following question: *How do crosslinguistic differences concerning syntactic, semantic and lexical properties of ditransitive constructions contribute to our understanding of children's language acquisition and the learnability problem?* An answer to this research question can be formed by addressing the six sub-questions in the discussion below.

1. At what age do English and Dutch children acquire the rule(s) of active dative alternation?

Previous research has often addressed the acquisition of English active dative alternation. English-speaking children have been found to use both the prepositional dative construction and the double object construction from early on, but this does not mean they are already aware of the dative alternation rules at the earliest stages of development. English active dative alternation is subject to two constraints. First, the semantic constraint states that double object constructions must denote a change of possession rather than just a change of location. Second, the morphophonological constraint states that verbs of Latinate origin cannot alternate. The semantic constraint has been argued to be only a necessary condition on dative alternation; sufficient conditions are formed by so-called narrow-range rules, which let some but not all verb groups denoting changes of possession alternate. Both production and comprehension data have demonstrated that the semantic constraint, at least the broad-range rule, is acquired around age 5, but that even before that age children show some sensitivity to it. Because Latinate verbs are generally acquired later than native verbs, the morphophonological constraint is acquired late in children's development, possibly as late as age 15, although some studies have found nine-year-olds to be slightly sensitive to it.

In Dutch, the situation is different: there is no evidence for a morphophonological constraint, but the semantic constraint applies to both the double object construction and the prepositional dative construction with *aan* 'to'. Consequently, regardless of semantics, if Dutch children hear a verb in either a double object construction or an *aan*-dative, they can generally safely assume that it is an alternating verb. In contrast, English-speaking children can only make such assumptions if they hear a verb in a double object construction. This makes the learnability problem of active dative alternation less pronounced in Dutch than in English. As a result, Dutch children are predicted to acquire active dative alternation (specifically, the semantic constraint on dative alternation) earlier than English-speaking children. Studies 3a and 3b addressed Dutch children's acquisition of active dative alternation and found that, if children aged between 6 and 10 hear a verb in the double object construction, they will accept it in a (true) prepositional dative construction as well, which suggests that they allow the verb to alternate. It is not clear whether this also happens in the other direction. In study 3b, the children, who learned novel verbs from prepositional dative constructions, were not able to accurately judge the trueness of double object constructions. However, this does not

necessarily mean that they thought the novel verbs could not alternate; see sub-question 6 for an explanation of children's difficulties in judging double object constructions.

In addition, because the materials in studies 3a and 3b all obeyed the semantic constraint, it is not clear whether the children had acquired this constraint. Future research should, therefore, directly compare children's judgments of *aan*-datives and double object constructions denoting changes of possession and changes of location (i.e., sentences obeying and violating the semantic constraint). Still, the results from study 3a suggest that Dutch children aged 6 to 10 have formed some rule of active dative alternation. Future studies should test younger Dutch children's comprehension in order to find out if, as was predicted, active dative alternation is acquired earlier than the age of 5, the age at which English-speaking children have mastered the semantic constraint.

## 2. How do English and Dutch children use the rules of active dative alternation?

The conservatism hypothesis on dative alternation claimed that children only use rules to summarize information and not to make predictions about new items without positive evidence that these items are not exceptions. In contrast, according to the criteria hypothesis, children do use rules productively, generalizing them to new items and sometimes even overgeneralizing them. English-speaking children's productions of double object constructions have provided evidence for the criteria hypothesis. That is, children become aware of the constraints on active dative alternation through positive evidence and form productive rules based on these constraints. They start generalizing these rules onto newly acquired verbs even before they are completely in place. In approximately 5% of cases, this will lead to overgeneralization mistakes: double object constructions in which one or both constraints are violated. Despite their ability to apply rules to new items, however, children generally show conservative tendencies and mostly use verbs in constructions they have heard them in before.

Based on this evidence for English, similar behavior could be expected for Dutch children acquiring the rules of active dative alternation. Studies 3a and 3b found that Dutch children between 6 and 10 years old had formed some rule of dative alternation. These studies used nonsense verbs that the children had never heard before, which confirms that they applied this rule productively to newly acquired verbs.

## 3. Do the rule(s) of active dative alternation in English and Dutch apply to passive ditransitive constructions?

In English passive dative alternation, that is, the alternation between direct object passives (i.e., the passive forms of prepositional dative constructions) and indirect object passives (i.e., the passive forms of double object constructions), the semantic constraint applies in the same way as in active dative alternation. However, the role of the morphophonological constraint is not entirely clear. The results from study 1 suggest that it applies less strictly to passives than to actives, possibly caused by differences between speakers or by differences between verbs. Still, in both cases the question remains if it is possible for active and passive forms of one and the same verb to have such different representations that one form can alternate whereas the other cannot. Future research should, therefore, not only address the possible differences between speakers and verbs, but also aim to find an underlying explanation for such differences. Once the role of the morphophonological

constraint in passive dative alternation is established, children's acquisition patterns of Latinate ditransitive passives can provide important insights in exactly how productively children use rules. Do they take the rules from active dative alternation and apply them to passive dative alternation, or do they learn the possibly very similar rules of passive dative alternation all over?

In Dutch, the rules of passive dative alternation are quite different from the rules of active dative alternation. The semantic constraint, which applies to both double object constructions and *aan*-passives, also applies to direct object passivization, but not to indirect object passivization. Because of crucial differences between Dutch and English case assignment in ditransitive constructions, the direct object passive is the main passive form of both double object constructions and prepositional dative constructions. In contrast, indirect object passivization is subject to lexical constraints, allowing only specific verbs to occur in this passive, and to case-related constraints on the direct object, allowing indirect object passives only if the direct object is non-nominal. Besides the direct and indirect object passives, however, Dutch has the so-called *him*-construction. This construction has been argued to be a direct object passive in which the indirect object can move to the subject position under information structure related constraints. Because it is often indistinguishable from an indirect object passive, many sentences are ambiguous even to adults. As a result, learning in which contexts indirect object passivization is or is not allowed is expected to be quite difficult for Dutch children.

In short, although the acquisition of English ditransitive passives is not yet able to be predicted with certainty, Dutch ditransitive passive input appears to be much less straightforward, leading to the expectation that Dutch children acquire passive alternation later than English-speaking children.

4. At what age do English and Dutch children acquire the rule(s) of passive dative alternation?

For English, no data exist on children's acquisition of ditransitive passives. Conducting the proposed studies 4a and 4b, which address this issue, will provide an answer to this question. If children accurately accept and reject direct and indirect object passives, this means that they can correctly interpret these sentence types. However, 4a and 4b only include native-like verbs. Depending on the exact role of the morphophonological constraint in passive dative alternation, future studies should also address children's acquisition of Latinate passives. As is the case with active dative alternation, older age children will likely still make more mistakes with Latinate verbs than with native verbs, as Latinate verbs are generally acquired later than native verbs.

Unlike the proposed studies 4a and 4b, studies 3a and 3b have already been conducted, addressing Dutch children's acquisition of both prepositional direct object passives and (prepositionless) *him*-constructions. The studies focused on these constructions so that they could be compared to English (prepositional) direct object passives and English indirect object passives. Future studies should include Dutch indirect object passives and prepositionless direct object passives. In addition, the acquisition of the semantic constraint on direct object passivization should be more directly addressed by comparing children's judgments of sentences obeying and sentences violating this constraint. Similarly, the acquisition of the semantic, lexical, and information structure constraints on *him*-constructions and indirect object passives should be addressed in future studies.

The results of studies 3a and 3b showed that, in the ages between 6 and 10, Dutch children are not able to accurately interpret the prepositionless *him*-constructions yet: in both studies, true and false *him*-constructions were rejected equally often. However, this age group can accurately interpret prepositional direct object passives. Studies 3a and 3b should be replicated with older children in order to find out at what age Dutch prepositionless passives are acquired. Comparisons with English data from studies 4a and 4b will tell whether Dutch passive dative alternation is acquired later than English passive dative alternation.

5. How do English and Dutch children use the rules of passive dative alternation?

As was discussed above, English-speaking children's production data suggested that the rules of active dative alternation are used productively, sometimes resulting in overgeneralizations. Because active dative alternation and passive dative alternation are quite similar in English, it is expected that children use passive dative alternation productively as well. Unfortunately, there is no evidence of English-speaking children overgeneralizing passive dative alternation yet. Future results from studies 4a and 4b should, thus, demonstrate if this expectation is correct. If these studies show that children apply the rules of passive dative alternation to newly acquired nonsense verbs, this would indicate that the rules are generalized onto new items, as are the rules of active dative alternation.

Studies 3a and 3b have not been able to answer the same question for Dutch. The children who participated in these studies did not apply passive dative alternation rules to the newly acquired nonsense verbs, which could mean that they either had not formed such rules yet, or they had formed rules but did not apply them to the verbs acquired in these studies. However, because the same children did apply the active dative alternation rules to the novel verbs in these studies, this latter explanation is less plausible.

6. How conservative are English and Dutch children in the alternations that they allow for newly acquired ditransitive verbs?

Specifically, the question is whether children who learn novel verbs in prepositionless active sentences (i.e., double object constructions) (studies 3a and 4a) accept these verbs in prepositionless active constructions only, in prepositionless active and passive sentences, in prepositional and prepositionless actives, or in both prepositional and prepositionless actives and passives. Similarly, do children who learn verbs in prepositional active sentences (i.e., prepositional dative constructions) (studies 3b and 4b) accept these verbs in prepositional actives only, in prepositional actives and passives, in prepositional and prepositionless actives, or in both prepositional and prepositionless actives and passives? Just looking at study 3b, it seems that Dutch children who acquired a novel verb from a prepositional dative construction accepted this verb in both active and passive prepositional constructions, but mostly rejected prepositionless constructions. Moreover, they applied the argument order of prepositional dative constructions (i.e., agent-theme-goal) to double object constructions, accepting false double object constructions in which arguments were interchanged. So, the children who participated in study 3b appeared quite conservative, clearly preferring the novel verbs in prepositional sentences.

However, the children in study 3a, who were taught novel verbs in double object constructions, did not reject prepositional constructions more than prepositionless constructions. On the contrary, the results from this study were largely similar to the results from study 3b, which suggests that the children did not conservatively prefer the constructions they first heard the novel verbs in. Still, the children in study 3a interpreted double object constructions somewhat more accurately than the children in study 3b and did not reject prepositionless constructions as often. The findings from both studies can be explained by looking at judgments from adult Dutch speakers. As found in study 2, prepositionless constructions are more difficult to interpret even for Dutch adults. It is, therefore, possible that children generally prefer prepositional constructions and tend to apply the argument order of prepositional dative constructions to double object constructions. In study 3b, this behavior was encouraged by the input, which contained many prepositional constructions, making the children seem more conservative. In study 3a, however, teaching the novel verbs in double object constructions exposed the children to more prepositionless constructions, which caused them to use prepositional constructions as defaults to a lesser extent.

In the future, studies 4a and 4b should be conducted with English-speaking children to find out whether they have preferences for prepositional constructions similar to Dutch children. Depending on children's development, the effects of such preferences may be more or less visible, so replicating these studies with children of different ages may provide interesting insights.

*How do crosslinguistic differences concerning syntactic, semantic and lexical properties of ditransitive constructions contribute to our understanding of children's language acquisition and the learnability problem?*

Now that the six sub-questions have been discussed, the main research question can be answered. First, with respect to the syntactic properties of ditransitive constructions, there are clear syntactic and case-related differences between the passive ditransitive constructions of Dutch and English. Whereas English direct and indirect object passives are the passive forms of, respectively, prepositional dative constructions and double object constructions respectively, in Dutch, both prepositional dative constructions and double object construction can be passivized into direct object passives. Indirect object passivization is much more restricted in Dutch than it is in English, but the *him*-construction, a form of the direct object passive in which the indirect object moves to the subject position, often looks like an indirect object passive. Such differences ultimately cause English passive dative alternation to seem more 'learnable' than its Dutch counterpart. This difference emphasizes the importance of input quality and quantity for language learnability: Dutch children need to hear a large amount of clearly disambiguating sentences before they can learn the constraints on the different ditransitive passives, such as the semantic and information structure related constraints on the direct object passive and the *him*-construction and the lexical and case-related constraints on the indirect object passive. Besides syntactic differences between languages, this study has briefly looked at the highly debated syntactic distinctness of prepositional dative constructions and double object constructions within languages, specifically English. In contrast to the differences between languages, this distinctness does not affect learnability: because alternating verbs have no overt syntactic features that distinguish them from non-alternating verbs, children cannot use this as a cue in their acquisition process.



Second, the semantic differences between Dutch and English specifically affect the learnability of active dative alternation. Whereas one English preposition can be used in sentences denoting both changes of possession and changes of location, Dutch uses two separate prepositions. In other words, the semantic constraint on dative alternation not only applies to Dutch double object constructions, but also to Dutch *aan*-datives. As a result, Dutch active dative alternation appears more 'learnable' than its English counterpart. In addition, there are differences between the narrow-range semantic rules of Dutch and English. Because of these differences, children's knowledge of the narrow-range rules cannot be innate, which again demonstrates the importance of input in the acquisition of phenomena posing learnability problems.

The third type of factor to be discussed is lexical properties of ditransitive verbs. Like there are semantically related verb groups in English that 'just' do not alternate, as they do not fall under semantic narrow-range rules allowing them to do so, Latinate verbs 'just' are not allowed to alternate either. Dutch not only has different narrow-range rules than English, which is believed to be caused by more or less arbitrary crosslinguistic variation, but the morphophonological constraint does not apply either. Such lexical differences may cause differences between the ages of acquisition in different languages. Specifically, because Latinate verbs are acquired quite late, the rules of dative alternation are completely mastered at a much later age in English than in Dutch. In Dutch, lexical factors determine which verbs can or cannot occur in the highly restricted indirect object passives. Future studies should investigate the similarities between the verbs that do so. Depending on how many verbs with particular properties do or do not alternate, a productive rule may or may not be formed. Consequently, children learn either by forming and applying rules or they learn item-by-item, as evidenced by the presence or lack of overgeneralizations.

To conclude, syntactic, semantic and lexical properties of ditransitive verbs all contribute to the constructions that can and cannot occur in different languages, causing differences in the 'learnability' of ditransitive constructions and alternations. Moreover, children's awareness of such properties, such as the semantic differences between different ditransitive constructions, is crucial in the acquisition process. Future research should further investigate both children's comprehension and production of different ditransitive constructions, suggestions for which have been done throughout this thesis. Moreover, it should extend the focus to comparing other learnability problems in different languages to find out whether these are also acquired through positive evidence, as was found for dative alternation. Finally, the role of input may be further addressed by investigating how bilingual children and second-language learners acquire learnability problems that differ between languages, such as dative alternation in Dutch, English or other languages.

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## Appendix A: Study 1 test sentences

### **Latinate verbs double object construction:**

1. The moving company delivered Anna a package with some of her stuff.
2. Charles donated the natural history museum a dinosaur bone.
3. The teacher narrated the bored class a story.
4. Mary recommended Bob a book about the history of their home town.
5. Roger transferred Jennifer a large part of his savings.

### **Latinate verbs indirect object passive:**

1. Mary was delivered a box of cat food.
2. The local church was donated sixty boxes of candles.
3. John was narrated a beautiful story from Japan.
4. The housekeeper was recommended a special type of laundry detergent.
5. The oldest son was transferred a bar of pure gold.

### **Native verbs double object construction:**

1. John wrote Bill a four-page letter.
2. The salesman showed the excited customer a new vacuum cleaner.
3. The teacher taught the student a solution to the difficult math problem.
4. The poet read the audience a very personal poem.
5. The principal paid Susan some money for her help during the school fair.

### **Native verbs indirect object passive:**

1. The bank was written a formal complaint letter.
2. The magician's apprentice was shown a difficult trick.
3. The aspiring mechanic was taught a solution for the car's problems.
4. The preschoolers were read the school motto.
5. The nurse was paid a small percentage of the costs she made.

## Appendix B: Verbs and videos study 2, studies 3a and 3b, and studies 4a and 4b

The six videos marked with an asterisk were used as practice items in studies 3a and 3b and studies 4a and 4b. Study 2 and studies 3a and 3b used the novel Dutch verbs; study 4 uses the novel English verbs. The video files are available upon request.

Novel verb Dutch	Novel verb English	Description of video
* <b>plurgen</b>	<b>floose</b>	An elephant has a pear between his legs, drags it towards a monkey and kicks his leg up so that the monkey catches the pear.
*		Big Bird has a pear between his legs, drags it towards Elmo and kicks his leg up so that Elmo catches the pear.
* <b>giepen</b>	<b>gump</b>	A monkey has a ball on his head, lifts his legs up and walks on his hands towards an elephant, so that the ball ends up with the elephant.
*		Elmo has a ball on his head, lifts his legs up and walks on his hands towards Cookie Monster, so that the ball ends up with the elephant.
* <b>bluren</b>	<b>pilk</b>	A monkey puts a shoe on his head, his back towards a giraffe, and jumps in the air so that the shoe is thrown, to the back, towards the giraffe; the giraffe catches the shoe.
*		Cookie Monster puts a shoe on his head, his back towards Big Bird, and jumps in the air so that the shoe is thrown, to the back, towards Big Bird; Big Bird catches the shoe.
<b>smoeken</b>	<b>norp</b>	A giraffe lifts an elephant into the air with a hook-shaped object, the elephant spins through the air towards a monkey; the monkey catches the elephant.
		Elmo lifts Cookie Monster into the air with a hook-shaped object, Cookie Monster spins through the air towards Big Bird; Big Bird catches Cookie Monster.
<b>kwaren</b>	<b>meek</b>	A monkey sticks out his arm and leg and hops forward, this way pushing a giraffe towards an elephant; the elephant catches the giraffe.
		Cookie Monster sticks out his arm and leg and hops forward, this way pushing Big Bird towards Elmo; Elmo catches Big Bird.
<b>prenen</b>	<b>tam</b>	An elephant lifts a monkey up and puts him on a rope that is suspended in the air, the monkey slides towards a giraffe on the rope; the giraffe catches the monkey.
		Big Bird lifts Elmo up and puts him on a rope that is suspended in the air, Elmo slides towards Cookie Monster on the rope; Cookie Monster catches Elmo.
<b>troven</b>	<b>doak</b>	An elephant puts a monkey on his back and then on his feet as he makes a handstand, walks on his hands towards a giraffe; the giraffe catches the monkey.
		Elmo puts Big Bird on his back and then on his feet as he makes a handstand, walks on his hands towards Cookie Monster; Cookie Monster catches Big Bird.

<b>morken</b>	<b>pell</b>	A giraffe lifts an elephant up and spins around with the elephant in his arms towards a monkey; the monkey catches the elephant.
		Cookie Monster lifts Elmo up and spins around with Elmo in his arms towards Big Bird; Big Bird catches Elmo.
<b>klepen</b>	<b>jape</b>	A monkey uses a spoon-like object to lift a giraffe's legs up and push the giraffe towards an elephant; the elephant catches the giraffe.
		Big Bird uses a spoon-like object to lift Cookie Monster's legs up and push Cookie Monster towards Elmo; Elmo catches Cookie Monster.
<b>domen</b>	<b>tonk</b>	A giraffe pushes a football-shaped cart, scoops a monkey up with it, and the giraffe continues to push the cart with the monkey on top of it towards an elephant; the elephant catches the monkey.
		Cookie Monster pushes a football-shaped cart, scoops Elmo up with it, and Cookie Monster continues to push the cart with Elmo on top of it towards Big Bird; Big Bird catches Elmo.
<b>jalpen</b>	<b>moop</b>	An elephant lies on his back and pushes himself forward by moving his legs, pushes a monkey towards a giraffe; the giraffe catches the monkey.
		Big Bird lies on his back and pushes himself forward by moving his legs, pushes Cookie Monster towards Elmo; Elmo catches Cookie Monster.

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