The Effects of Animacy and Givenness on Object Order in Croatian Child Language

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0. Abstract

This study investigates how givenness and animacy influence object order (IO-DO vs. DO-IO) in ditransitive constructions in Croatian child language. We have conducted an elicitation task with 59 monolingual Croatian children (mean age=4;4) and 36 adult controls (mean age=21), in which the participants were asked to describe images depicting ditransitive actions. These actions differed with regard to givenness (DO given, or IO given) and animacy (IO animate, or both IO and DO animate). Both groups demonstrated an animacy effect, as the preference for DO-IO significantly increased when both objects were animate, compared to when only the IO was animate, with adults showing the highest preference. A givenness effect, however, was found only when the DO was given. The children exhibited a new>given preference when only the IO was animate, but, when both objects were animate, there was an indication of given>new. We conclude that adults prefer the DO-IO order, and children are strongly influenced by animacy.

1. Introduction

This study investigates how non-syntactic factors such as animacy and givenness are reflected on object order in ditransitive structures in Croatian pre-schoolers and adults. In ditransitives structures in Croatian, both object orders—indirect-direct object (IO-DO)

and direct-indirect object (DO-IO)—are grammatical and attested. However, word order is sensitive to animacy and givenness, and thus IO-DO and DO-IO are used in different contexts. The main difference between these factors is that the animacy of a referent is constant (and not contextually bound), while givenness is dependent on the context. This makes animacy easier to grasp (and therefore acquired more easily), since attention to the context is not required. Conversely, givenness requires the child to observe the discourse and update their judgment about whether an argument is given or not at a specific point in the discourse. Both animacy and givenness influence the argument to be placed first (i.e. animate-first, given before new). Thus, the animate argument should precede the inanimate argument, and given (old) information should come before new information.

We have tested 59 monolingual Croatian children (mean age=4;4) and 36 adult controls (mean age=21) with an elicitation task in which they described pictures depicting ditransitive actions across three sets of pictures. The givenness of the recipient (IO) and the theme (DO) were manipulated throughout their occurrence in the target pictures, and reinforced with pictures of the same referent, before presenting the next target picture. The subject and IO were always animate, while the animacy of the DO was manipulated (inanimate vs. animate). This setup provided two animacy conditions: prototypical animacy condition (IO-animate and DO-inanimate), and the balanced animacy condition (both objects animate).

The results show that both children and adults were sensitive to animacy, as the occurrence of DO-IO orders was considerably increased when both objects were animate, compared to the condition when only the IO was animate. Both groups displayed a givenness effect when the DO was given, since the proportion of object

orders was significantly different in this condition from the rest of the task. No effect was observed related to the givenness of the IO. For the children, we found a new>given preference in the prototypical animacy condition, but the trend of responses changed when the animacy was balanced, and showed an inclination towards given>new.

The paper is structured as follows: in the background section, we describe the ditransitive structures in Croatian, and provide a summary of the animacy-first order and the given before new principle, along with previous child language studies. Next, we proceed to formulating our research questions and laying out the predictions. The methodology and the results sections follow. In the Discussion section, the results are discussed in relation to our predictions. A brief summary concludes the paper.

2. Background

In this section, we outline the literature necessary for formulating the research questions and predictions. We focus on the key factors: ditransitive structures, animacy, and givenness.

2.1 Ditransitive structures

Ditransitive structures are comprised of three arguments: the subject, the direct object (DO) and the indirect object (IO). The main interest of this study is relationship between the DO and IO. Various languages have different strategies for arranging the two objects. If a language has overt case marking, such as German or Croatian, both object order variants are possible, as shown in example (1). These languages use the accusative case

to express the theme (DO) and the dative case to express the recipient (IO). Languages with no overt case marking, like English, have two different structures used to convey the different object orders, like in example (2).

(1) a. Marlon daje Stigu jabuku.
Marlon$_{NOM}$ gives Stig$_{DAT}$ apple$_{ACC}$
'Marlon is giving Stig an apple.'
b. Marlon daje jabuku Stigu.
Marlon$_{NOM}$ gives apple$_{ACC}$ Stig$_{DAT}$
'Marlon is giving an apple to Stig.'

(2) a. Marlon gave Stig an apple. – Double Object Dative (DOD)
b. Marlon gave an apple to Stig. – Propositional Dative (PD)[1]

A structural variation in ditransitives is present in a very limited portion of the Croatian lexicon, appearing only with three verbs: *(po)nuditi* 'offer', *(po)služiti* 'serve' and *pokloniti* 'give as a gift' (Zovko- Dinković, 2007). The alternative expresses the recipient with the accusative and the theme with the instrumental case. An example of the two structures using 'offer' is presented in example (3).

(3) a. Marlon je ponudio Stigu jabuku.
Marlon$_{NOM}$ is$_{AUX}$ offered Stig$_{DAT}$ apple$_{ACC}$
a' Marlon je ponudio jabuku Stigu.
Marlon$_{NOM}$ is$_{AUX}$ offered apple$_{ACC}$ Stig$_{DAT}$
b. Marlon je ponudio Stiga jabukom.
Marlon$_{NOM}$ is$_{AUX}$ offered Stig$_{ACC}$ apple$_{INS}$
b' Marlon je jabukom ponudio Stiga
Marlon$_{NOM}$ is$_{AUX}$ Apple$_{INS}$ offered Stig$_{ACC}$
'Anna offered cake to her parents.'

[1] Croatian also allows PP constructions, but only in cases where it is intended as a change of location, and not a change of possession: e.g. *Ivan je bacio loptu prema Ani* (John$_{NOM}$ threw ball$_{ACC}$ towards Anna$_{DAT}$), in which case we do not expect Anna to catch the ball. These structures are not elicited in the current task, but have occurred when both objects were animate, most likely due to an interpretation of a caused motion (Levin, 2008). These occurrences were excluded due to the weight of the PP.

This possibility of case alternation is why 'offer' was chosen as one of the verbs to be elicited in our task[2].

2.2 The effect of animacy on word order and its acquisition

As previously mentioned, the animacy of a referent does not vary based on the context of discourse: if a referent designates an animate being, it will be animate, regardless of whether it has already been given, or whether it is in focus. It is a semantic, not a pragmatic, property that shapes information structure. Animate entities are conceptually highly accessible, and thus easier to retrieve (Branigan, Pickering, & Tanaka, 2008). Animate entities are also more likely to be prominent in the discourse, because discourse prominence is related to the speakers' empathy, and animate entities are more eligible than inanimate entities to be prominent (Malchukov, 2008).

There is a vast body of research that indicates that animacy influences word order in the direction of animacy-first, which means that animate arguments precede inanimate ones. For example, animacy is found to influence the preference of passive/active structures, depending on whether the patient or the agent is animate (Ferreira, 1994 for English; Gennari, Mirković, & MacDonald, 2012 for English and Spanish; Van Nice & Dietrich, 2003 for German). More relevant to the present study, animacy was also found to have an effect on the choice of dative structure in a corpus study conducted on German (Kempen & Harbusch, 2004). The authors found that there is a direct effect of animacy on linearization.

[2] The alternating structure (accusative-instrumental) in example (3b) failed to be elicited in the children, most likely due to the low frequency of this structure; the adult controls had only produced it twice in the task. Thus, this structure is disregarded for the rest of the analysis.

For Croatian, an acceptability judgment task was conducted on the adult population by Velnić (submitted), and it was found that, when animacy is balanced (by having both objects either animate or inanimate), the DO-IO variant is preferred to the IO-DO variant. When only the IO was animate, IO-DO orders were accepted much better, compared to cases where the animacy was balanced. This suggests that animacy is a relevant factor in word order choice in Croatian.

In ditransitive structures, animacy is closely linked to the IO, as prototypically the recipient is animate, and the theme is not (henceforth *prototypical animacy*). Thus, the IO should be in a privileged position, appearing as the first object. However, if animacy were the only factor at play, we would rarely see realisations of the DO-IO order in any language. But that is not what happens, as DO-IO occurrences were found in Croatian corpora (Kovačević, 2004; Kuvač Kraljević, 2016), albeit to a lesser extent than the IO-DO.

Studies on animacy in child language suggest that animacy is acquired rather early, since children from around the age of two are able to distinguish animate from inanimate NPs in an adult-like manner (de Marneffe, 2012). Like in adults, an obvious effect of animacy is noticed in the studies of active/passive use, with preference for passive sentences when only the patient is animate (Lempert, 1989).

With regard to the effect on ditransitive structures, Snyder (2003, p. 56) shows that young children (around the age of three) are very attentive to animacy in their choice of ditransitive structure, and rely less on animacy as they grow older. Snyder's (2003) corpus data (from English and Tahitian French) suggest that, as children rely less on animacy, other factors influence their word order choices. She argues that children use animacy as a stand-in for information status, until they are able to grasp what constitutes given

information for the interlocutor. The fact that animacy is more relevant at a young age suggests that there will be a difference between children and adults regarding its relevance in determining word order.

Apart from the above, there are few studies that focus specifically on the effects of animacy.

2.3 The effect of givenness on word order and its acquisition

Many languages are affected by the given before new principle (henceforth given>new), which entails that, if all other factors are equal, speakers will prefer to place the information that is familiar to the listener first, and place the new information later (Birner & Ward, 2009).

The given>new principle originated for the Slavic languages with the Prague school linguistics (Firbas, 1964), and the effects of this factor are still debated. More precisely, divergent implications were made on how strict the principle is, in the case of Czech: strict (Kučerová, 2012) or less strict (Šimík, Wierzba, & Kamali, 2014). Kucerová (2007) suggests that, in Czech, only SVO, the basic word order, can be used in a variety of contexts, while other word orders must be used only in contexts that relate to the givenness values of their elements. In Kučerová (2012), the research is expanded to Russian and Serbo-Croatian[3]; the claim is that, in these languages, givenness is always marked, with given elements preceding new ones, and a new>given order is argued to be ungrammatical. The analysis provided by Šimík et al. (2014) for Czech is less strict,

[3] Term used by Kučerová (2012)

and the authors claim that given objects can occur anywhere in the sentence, excluding the final position, which receives default main sentence stress.

More specifically for Croatian, Velnić (submitted) found a givenness effect in an acceptability judgment task on word order choice conducted on adult speakers. In this experiment, IO-DO structures were considered more acceptable when the IO was given, while the DO-IO was judged better in conditions when the DO was given, or when neither object was given. Conversely, the data from Velnić (2014) indicate that IO-DO is predominant in naturalistic speech, with much fewer cases of the DO-IO order being attested (Child Directed Speech: 60/304 occurrences were DO-IO, Children: 19/258 occurrences were DO-IO). Velnić (accepted) analysed a portion of these data and found limited occurrences of new>given in the child data (2/12 of DO-IO occurrences); the adult data displayed only the given>new order.

Ditransitive structures can accommodate given>new with the DO-IO order when the theme is given, and with the IO-DO order when the recipient is given. Clifton and Frazier (2004) and Brown, Savova, and Gibson (2012) (for English) along with Kizach and Balling (2013) (for Danish) have shown that having a given>new order facilitates sentence processing for DOD but not for the PD (examples (2a) and (2b) above). It has been suggested that discourse information is incorporated into the structure of the DOD, but not that of the PD, and thus the DOD has constraints on how the given and new information is ordered, allowing only for given>new (Brown et al., 2012). Kizach and Mathiasen (2013) have also found that native Polish speakers learning Danish as a second language acquire the native Danish pattern quickly, implying that Polish has the same givenness asymmetries between DOD and PD as Danish. In languages that do not have different structures for dative alternation, such as German and Russian, it has been found

that DO-IO is the canonical order (Røreng, 2011 for German; Titov, 2017 for Russian) due to its wide contextual applicability, while the IO-DO is either contextually motivated (Røreng, 2011) or signals a meaning not available to the DO-IO (Titov, 2017). While both of these studies dealt with the background/focus distinction, rather than the given/new distinction, their findings are still applicable in terms of which word order is the underlying one.

Studies conducted on the effect of givenness on child language have reached divergent results, and there is still no general consensus regarding the age when givenness is in place. Some studies have found a new>given preference in young children (Baker & Greenfield, 1988; MacWhinney & Bates, 1978); however, these experiments are excluded here, since they were conducted on children in the one- or two-word stage, and thus do not apply to the present study.

First, we summarize the studies that find a given>new effect. Going back to Snyder (2003) whose corpus study was already outlined in the section on animacy. In the mentioned corpus study Snyder (2003) also found a progressive effect of givenness on word order in ditransitive sentences. Before the age of 7 the givenness effect is noticeable, but other factors—such as animacy and weight—are more important in determining word order, and the corpus even contains new IOs being placed before the DO at ages of 6 and 7 (p.53). At age 7, givenness becomes the most relevant factor for object placement, but the children are not adult-like yet. The author does not state explicitly in which proportion the two object orders are attested in the corpus, so we cannot conclude which word order is preferred.

A clearer effect of givenness was obtained by Stephens (2015) with elicited production tasks. She found that four-year-olds tend to produce given>new orderings in

their dative constructions. In conditions with given themes (DO), children categorically produced the PD (DO-IO order); when the recipient (IO) was given, the participants were more likely to produce a DOD (IO-DO order) (p.416). The same pattern was found in the adult controls (p.424). This is consistent with the studies on adult language referred to above, which found a stronger givenness effect on given themes, compared to given recipients (Clifton & Frazier, 2004; Kizach & Balling, 2013).

Anderssen, Rodina, Mykhaylyk, and Fikkert (2014) conducted a semi-spontaneous production task on Norwegian children (ages 4-6). Like English, Norwegian exhibits the DOD and PD distinction. The authors find a givenness effect: the theme-given context yielded the PD structure most of the time, while the recipient-given condition was divided among PD and DOD productions, with the latter still being produced much more than in the theme-given conditions. However, the children also frequently omitted an object: half of the productions in the recipient-given condition are omissions, and the omitted object is almost exclusively the IO. Their conclusion is two-fold: firstly, children pay attention to givenness, but still overproduce the PD; secondly, the effect of givenness can also be observed in what children omit.

Among the studies that find no effect of givenness on word order, Mykhaylyk, Rodina, and Anderssen (2013) analysed the permutations of word order in ditransitive structures in Russian and Ukrainian 3-6-year-olds. The responses with no omissions were mostly expressed in the IO-DO order, with very little variation across the two givenness conditions. Although, there was an observable difference with age, as the older children used more DO-IO in the theme-given condition, but IO-DO was still the generally preferred object order. This suggests that Russian and Ukrainian children did not integrate the context in their ditransitive productions. However, when they omitted one object,

they seem to be sensitive to givenness as the omitted object is mostly the given one. It would seem that these children do not mark givenness through word order, but through other means, like using a null referent for the given argument.

Höhle, Hörnig, Weskott, Knauf, and Krüger (2014) conducted a test on German five-year-olds, in which they checked how faithfully the children reproduced ditransitive structures that violated word order (*ACC-DAT)[4] or definiteness (*indef-def) constraints. They found that children faithfully reproduced sentences with no violations, but, in the case of violations, they reproduced definiteness violations more readily than word order violations; meaning, that they faithfully reproduced the constraint-respecting IO-DO sentences, but the constraint-violating DO-IO sentences were also often reproduced as IO-DO. This entails that keeping IO-DO is more relevant than having the definite NP precede the indefinite NP. Givenness is not identical to definiteness, but they are related properties, as the given argument can be expressed with a definite NP, while a new argument is not likely to be expressed with a definite NP. However, the target sentences were provided in isolation, and a wider context might have strengthened the givenness effect in contrast to only marking it with a definite/indefinite article.

For Croatian, an analysis of the Double Object DataBase (Velnić, 2014), based on (Kovačević, 2004), shows a predominant use of the IO-DO order in both children and child-directed speech. Velnić (accepted) analysed this database and found that children use both given>new and new>given word orders. However, the corpus data had limited instances of combinations of given and new objects, as most of the objects were accessible. An overview of these studies is provided in table 1.

[4] They assume that IO-DO is the unmarked order

We can see that the findings correspond to whether the languages have Dative Alternation or not: if they do, the preference is for PD (DO-IO), if not, the IO-DO is preferred. It is also interesting to note that the child language studies on German and Russian and Ukrainian presented in this section seem to contradict the idea that DO-IO is the underlying word order (Røreng (2011) for German, Titov (2017) for Russian), since they show a preference for IO-DO.

Since Croatian does not have Dative Alternation, we should expect that IO-DO would also be the preferred word order amongst Croatian children, and they might choose to produce it even when the givenness context is set up against it.

Table 1: Overview of the findings from this section

Study	Language	Dative Alternation	Case Marking	Age Range	Task	Givenness Effect on Word Order	Object Order Preference
Anderssen et al. (2014)	Norwegian	Yes	No	4-6	Production	Yes	PD (DO-IO)
Stephens (2015)	English	Yes	No	3;10–5;4	Production	Yes	PD (DO-IO)
Snyder (2003)	English	Yes	No	3;3–8;1	Corpus	Yes, increasing with time	NA
Höhle et al. (2014)	German	No	Yes	4;5–5;6	Production	Yes, but weaker than the word order effect[5]	IO-DO
Mykhaylyk et al. (2013)	Russian and Ukrainian	No	Yes	3–6	Production	Weak	IO-DO
Velnić (accepted)	Croatian	No	Yes	0;10–3;2	Corpus	No	IO-DO preference

5 The sentences that violated the definiteness order were reproduced faithfully more frequently than the sentences that violated the DAT(IO)-ACC(DO) order, so there was an effect of givenness, but children were more likely to keep the preferred word order than to violate the definiteness order.

3. Research Questions and Predictions

The purpose of this study is to reveal how children integrate different animacy and givenness values in their ditransitive structures, and also to compare their use of word order to adult native speakers of Croatian. We will do so by attempting to answer the following research questions:

1. Do adults use different word orders to mark the different givenness conditions of the two objects?
2. Do children use different word orders to mark the different givenness conditions of the two objects?
3. Is the givenness effect clearer when animacy is balanced?
4. Do children and adults differ in their object order preferences in ditransitive structures?
5. Is there an animacy effect? Do the speakers have preference for different word order in situations of balanced and unbalanced animacy?
6. Do children pay more attention to animacy than adults?

The first research question is crucial in order to discover the target effect of givenness on word order, and thus make our results comparable across the two groups (adults and children). Givenness was shown to have an effect on word order preference in an acceptability judgment task on Croatian adult language (Velnić, submitted). Furthermore, the study on Croatian corpus data found no new>given orders in adults (Velnić, accepted). Thus, we expect that adults will use different word orders to signal givenness.

Based on the literature seen in section 2.3, we can expect that Croatian children will display an IO-DO preference, and we expect it to be the most frequently used word order. However, that does not exclude children being sensitive to givenness. So, taking into consideration the expected IO-DO preference, the children's sensitivity to givenness and how it affects object order should be most obvious when the given>new principle is in contrast to the IO-DO preference. We thus expect that the effect of givenness will be most clearly noticed when the DO is given and the IO is new.

We expect givenness to be a relevant factor in all conditions, but it will of course have a stronger effect on word order when animacy is neutralized. This is in accordance to Birner and Ward (2009), who states that the given>new preference surfaces when all other factors are equal. We thus predict a more obvious effect of givenness in the condition where both objects are animate.

With respect to the next question, we believe that the two types of speakers have different word order preferences. Firstly, findings from Mykhaylyk et al. (2013) and Höhle et al. (2014) indicate that children are less willing to deviate from their preferred order (IO-DO). Secondly, an acceptability judgment task conducted on Croatian found a preference for DO-IO (Velnić, submitted). Therefore, we expect the preferred orders (IO-DO for children, DO-IO for adults) to surface when the two objects have an equal givenness value. Nevertheless, if the ordering of the two objects is givenness-driven, we expect that when one of the objects is given, it will be the first object. Adults are expected to give givenness more consideration, and therefore vary their object order accordingly, thus producing more variation across the task.

We expect animacy to influence word order in both speaker groups, and this will be observed by comparing the condition where the IO is animate (i.e. prototypical animacy) to the condition with both-animate objects (i.e. balanced animacy).

With regard to the last research question, we expect that animacy will have a more prominent role for children, and they will thus have a stronger preference for IO-DO when the IO is animate. Accordingly, we expect to find a higher degree of DO-IO productions in both groups when the DO is also animate. However, as we expect the adult controls to rely more on givenness than on animacy, we do not expect that the adults will behave significantly different with regard to word order choice across the two animacy conditions when the given>new principle has to be applied to order the two objects.

4.Methodology

Here we outline the setup of the task.

4.1 Experiment

Our experiment tests two conditions of animacy and four conditions of givenness.

I refer to the two animacy conditions as prototypical animacy (IO-animate and DO-inanimate) and balanced animacy (both animate). Animacy is set up as a binary feature, animate/inanimate: the referents were either anthropomorphic animals or inanimate objects (e.g. cat or apple).

The four givenness conditions that are being tested are the following: none of the participants are given (No-G); the DO is given (DO-G); the IO is given (IO-G); or, all arguments are given (All-G). A referent is considered given if it has been already mentioned in the discourse. Thus, in any first image of an experimental set, nothing is given, because none of the referents had the opportunity to be mentioned before. Following that, if the DO from the previous image is present again, this creates the DO-G condition; if the IO from the previous image is repeated, we have the IO-G condition. The conditions were each illustrated by one action image, with the exception of the No-G condition, which consisted of two images: one in which no argument was given and another one in which the subject was given. They were merged under the No-G condition because neither object is given in both of those conditions, and the givenness of the subject is not relevant for the current study.

This experimental design was inspired by the puzzle task developed by Eisenbeiss (2011) for eliciting a broad range of case-marked forms, including double objects, in German. Eisenbeiss's method consisted of a puzzle board with cut-outs containing images depicting various actions, and puzzle pieces with the corresponding pictures to be put in the cut-outs. The children had to ask for the puzzle pieces corresponding to the pictures on the board and, since the pictures contrasted minimally one form the other, they were encouraged to mention all of the participants present in each picture. This method has proven to be successful, as it was engaging for the child, and target structures were easily obtained. In order to control for givenness and animacy, we hereby adapt the method by setting up the conditions mentioned in the previous paragraph. The main difference from the original task is that, here, the participants begin with an empty puzzle board, and the images were provided by the experimenter.

Three sets of images were used. Each set contained all givenness conditions presented, in the order as specified above (1. No-G; 2. DO-G; 3. IO-G; 4. All-G). Each set depicted a ditransitive action with the verbs *dati* 'give', *nuditi* 'offer', and *slati* 'send': the first two verbs had the prototypical animacy layout, while 'send' had balanced animacy. The verb 'give' was chosen because it is the prototypical ditransitive verb, and it is predominant in child language corpus data (Kovačević, 2004; Velnić, 2014). The verb 'offer' was chosen because it can yield structural dative alternation of case (Zovko-Dinković, 2007), as briefly described in section 2.1. Still, this alternation was not present in the children and had only two instances in the adult data. Lastly, 'send' was chosen in order to allow for balanced animacy, since it can accommodate an animate DO.

4.2 Participants

A total of 59 monolingual Croatian children between the ages of 3;7-5;2 (mean age=4;4, 26 males) were chosen. We chose this age range because it is similar to the range used by previous studies that tested ditransitives (Anderssen et al., 2014; Höhle et al., 2014; Mykhaylyk et al., 2013; Stephens, 2015). The children were recruited from four kindergartens in Rijeka, all part of a larger kindergarten group under the same administration. The parents had to sign an informed consent form in order for the children to participate.

The adult control group consisted of 36 participants aged 19-28 (mean age=21, 8 males). The participants were required to have been born to two Croatian parents and to have grown up in Croatia; other languages learned later in life were not controlled for. They each received a 100 Kuna (approximately 13 euros) gift certificate at a local

bookstore for their participation. The participants were recruited at the Psychology and Law department of the University of Rijeka.

4.3 Materials

The materials for this experiment consist of the images depicting ditransitive actions (action images), images of single participants that are meant to fortify the givenness effect (single images), and the image board. All the images were printed on white Plexiglas. An example of the images is depicted in figures 1 and 2.

The action images depicted actions of transfer, and were divided into the three sets already mentioned. Each set (n=3) contained five action images (total=15)[6], one for each givenness condition. The images were shaped differently from one another, and each set had one image corresponding to one shape on the board. We have also controlled for directionality, in that the order in which the participants were depicted varies (either left to right, or right to left), with the DO always depicted in the middle, in order to provide a clear depiction of the referents' interactions.

[6] Recall from section 4.1 that the No-Given condition consisted of two images.

Figure 1: Action image (from 'offer' set)

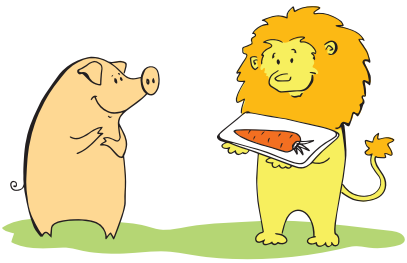


Figure 2: Single image (from 'offer' set)

The single images depicted one of the referents present in the action images. Their role was to reinforce the givenness condition, as they were presented in-between action images, and contained a referent present in the previous and in the following action image. Each set contained four single images (total=12).

All these images had to be placed on the board. The image board consisted of two wood planks attached to one another, with the top one containing five differently-shaped slots, one for each action image. At the bottom of the board there was a small shelf designated for the single images (subject, theme, or recipient) that reinforce which one is given in the following action image. An example of the board with some images placed on it is provided below.

Figure 3: Photograph of the image board with some images on it.[7]

4.4 Procedure

All the sessions were audio recorded. The recordings took place in a room on the kindergarten premises, where the child and the researcher could remain undisturbed. For the adult controls, the testing was conducted either in the psychology lab or in a classroom at the university of Rijeka. An audio recorder (model: Sony lcd-px333) was placed on the table, and the experimenter also manually recorded the children's responses as the testing proceeded. This was then used to facilitate the transcription process. The responses were not manually recorded for the adult controls, because the testing proceeded very smoothly, and the on-line transcription would have slowed the task down.

[7] NB: The way the images are placed on the board in the photograph is not exemplifying a real situation in the experiment

The distribution of the previously-mentioned shapes was different for each set. The shapes are not relevant for the study; their function was to make the task more entertaining for the child, and also to add more cognitive load to the task, so there is less chance for auto-priming. The images had the same order of givenness conditions across the sets: No-G, DO-G, IO-G, and All-G. There were two possible orders in which the images of a set could be presented, but the order of the givenness conditions remained unvaried. One of the orders in which the images were presented to the participants is shown in tables 2–4 for each verb. The referents (animals and objects) are different in every set, in order to avoid cross-condition givenness effects. Note that the descriptions in the tables below are merely describing what is on the action image, and do not reflect our expectations, or the actual productions of the participants.

Table 2: One possible order of images for 'give'

	Given	Action	Direction
1	**No given**	Fox gives apple to cat.	S>DO>IO
2	**S**	**Fox** gives flower to duck.	S>DO>IO[8]
3	**S & DO**	**Duck** gives **flower** to horse.	S>DO>IO
4	**S & IO**	**Fox** gives cake to **horse.**	S>DO>IO
5	**All**	**Duck** gives **apple** to **cat.**	IO<DO<S

[8] This image was originally supposed to have the IO<DO<S order, and it was illustrated that way, but during the printing process it was reversed and printed as a mirror image, which resulted in the inverse orders of the participants.

Table 3: One possible order of images for 'offer'

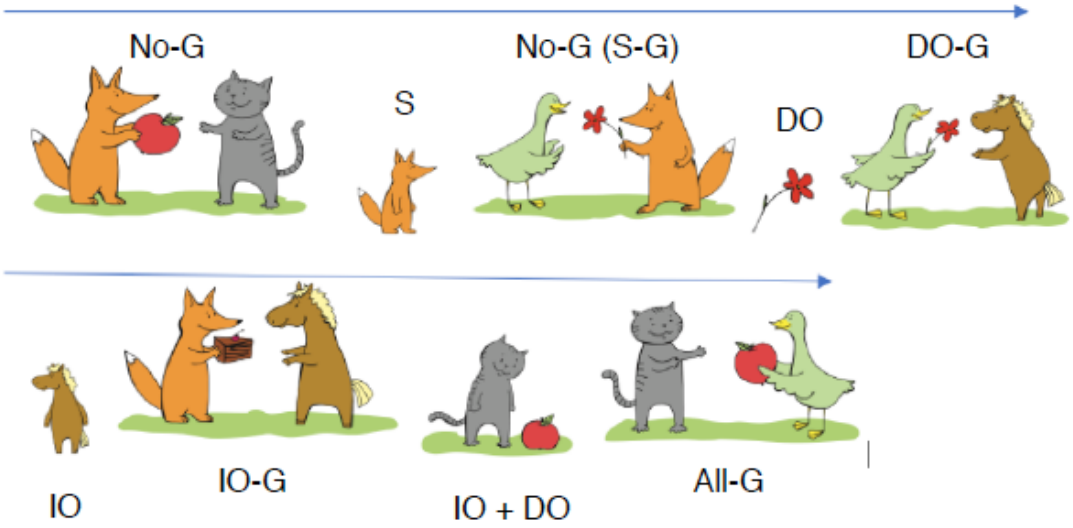
	Given	Action	Direction
1	**No given**	Lion offers lollipop to zebra.	S>DO>IO
2	**S**	**Lion** offers carrot to pig.	IO<DO<S
3	**S & DO**	**Pig** offers **carrot** to monkey.	IO<DO<S
4	**S & IO**	**Lion** offers sandwich to **monkey.**	S>DO>IO
5	**All**	**Pig** offers **lollipop** to **zebra.**	IO<DO<S

Table 4: One possible order of images for 'send'

	Given	Action	Direction
1	**No given**	Bunny sends puppy to elephant.	IO<DO<S
2	**S**	**Bunny** sends parrot to the turtle.	S>DO>IO
3	**S & DO**	**Turtle** sends **parrot** to the snail.	IO<DO<S
4	**S & IO**	**Bunny** sends mouse to **snail.**	IO<DO<S
5	**All**	**Turtle** sends **puppy** to **elephant.**	S>DO>IO

The second order in which the images could be presented to a participant is provided in the appendix. Thirty-four of the children received the images in order 1 (presented in tables 2-4) while 24 were presented with order 2. This imbalance is due to the fact that the two orders of images were presented on alternating days, and, on some days, there were more children tested than on other days. In the control group, 18 participants were given the images in order 1, and 18 in order 2. Figure 4 illustrates the task of presenting the images to the participants according to order 1 of 'give'.

Figure 4: Order 1 in which the images were given to the participant to elicit 'give'.



The task proceeded as follows. The experimenter and the participant sat opposite to each other. The image board was placed in front of the participant, positioned in such a way that the experimenter could not see what was being placed on it. The participant was instructed to receive the images, describe them, and place them in the appropriately-shaped slot. At the beginning of each puzzle set, the experimenter prompted the verb by saying "these images are about giving/sending/offering". The sets were given in a random order.

The images were given to the participant from a bag, facing down, so that the participant was the only one to see the image. After each action image, the participant received a single image of a referent that was present in the previous image, and that will also appear in the next action image. The experimenter and participant exchanged a few sentences about it, before proceeding to the next action image. The conversation usually consisted of the experimenter asking the participant whether this referent was the same

one as seen in the action image, or asking the participant whether they liked the referent on the single image. The latter strategy was more successful with children than with adults; the adults were not keen on expressing their liking for a referent. This was repeated until all five images of a set had been described and placed on the board. Once the board was complete, the experimenter and the participant took out all the images, the board was placed in front of the participant once more, and they proceeded with the next set of images. This was repeated for all three verb sets. At the end of the task, the child was accompanied back to the kindergarten group and the adult was given the reward.

As specified above, the sets were supposed to be given in a random order. However, after a few runs, we noticed that the 'send' set had less data loss in the children's productions if presented last. This set was harder than the other two, most likely due to an unprototypical situation of sending an animate referent to another animate referent. By having this set as the last one, the child was familiar with the procedure, and thus described the images more easily. We therefore proceeded by randomly giving one of the two IO-animate sets as first and second, while the both-animate set was given last.

5. Results

This section is dedicated to the results obtained by the task. We will start by accounting for the NA data, and then look into the responses to the different givenness conditions in each of the two animacy conditions. We compare children and adults within each of these sections.

5.1 Non-applicable data: production exclusions

The adult controls had 540 possible responses (5-targets x 36-adults x 3-sets) and we were able to use 439 of those. The NA data was due to: no ditransitive action (n=19), inverted referents (n=6), the use of clitics (n=6), and the use of a PP (n=70) that was excluded due to end-weight affecting the object order.

The children strongly overused the verb 'give' across all conditions, which still yielded a ditransitive. Hence, we are not excluding these data, as this task was not about testing the word order with a particular lexical verb, but about the effect of animacy and givenness on the object order combinations. Out of 885 possible responses (5-targets x 59-children x 3-sets), we were able to use 625 observations. The NA child data are categorized as follows: no response (n=5), no ditransitive action (n=74), use of a PP or a relative clause (n=39), case error with non-intelligible roles (n=6), referent inversion (n=67), omission of an object (n=58), use of a pronoun or clitic (n=10), experimenter's mistake (n=1).

Even though the use of a pronoun or a clitic is an indication of givenness, we have decided to exclude these forms, because they also influence word order, as a pronoun is usually placed before an NP, while clitics are syntactically fixed in second position. Furthermore, the data from the occurrences with a different structure cannot be used, because both PPs and relative clauses are more likely to be heavy, and thus their placement at the end of the sentence is dictated by weight.

The referent inversion consists of the child inverting the IO and DO roles by assigning the dative case to the target DO, and the accusative to the target IO. This was not a case mistake, since the children use the cases correctly in the other sets. Even

though we have accepted deviations from the intended verb, the inversion of the theme and recipient is a description of a different event entirely, and also influences the givenness conditions. All of the referent inversions were confined to the both-animate condition, where it was possible to invert the DO and the IO.

The children's object omissions will be discussed separately, in section 5.5.

5.2 Intended givenness vs. actual givenness

During the test, the child would often take an image, say what was on it, and then describe the action. In such cases, all the referents have to be counted as given. This problem only occurred infrequently in adults, as they typically did not mention anything prior to the ditransitive target. A crucial part of the data analysis is to observe how word order changes in relation to givenness. We thus had to account for what was actually given, and re-categorize the occurrences accordingly. Table 5 shows the final count of responses in each condition. Although adults did not deviate from the intended givenness condition, their number of responses is nevertheless provided in table 6. This is the final distribution of the data that will be analysed and discussed in the next section.

Table 5: Distribution of responses in the actual state of givenness in the child data

Condition	**No-G**[9]	**DO-G**	**IO-G**	**All-G**
N. responses	180	127	149	169
Total	625			

[9] Recall that the No-G condition includes two images for each set: No-G and Subject-G, because neither object is given in both of those conditions

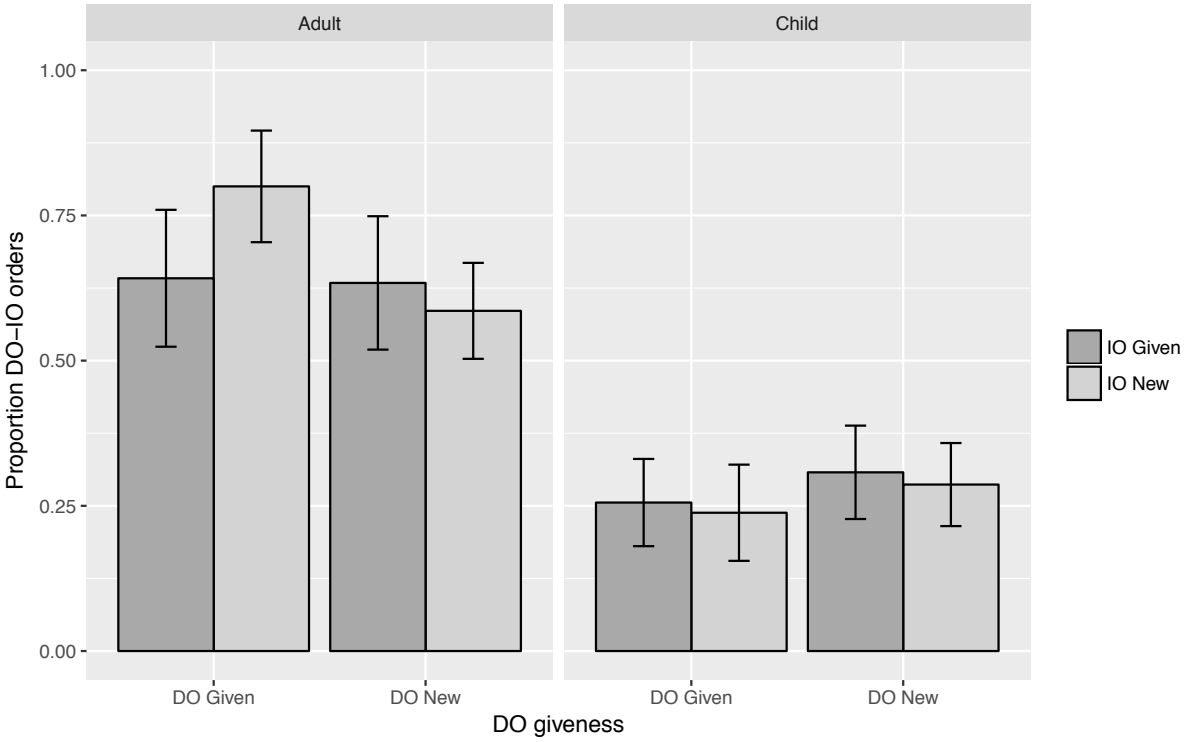
Table 6: Distribution of responses in the adult data

Condition	**No-G**	**DO-G**	**IO-G**	**All-G**
N. responses	177	86	91	85
Total	439			

5.3 Prototypical animacy condition

We first look at the responses in the IO-animate DO-inanimate condition, since this is the prototypical condition, which the speakers are exposed to the most. We have predicted that, for the children, the effect of givenness should be clearest in the DO-G condition, because it contrasts with what has been found to be the most frequently used object order (IO-DO). Figure 5 depicts the distribution of the object orders, grouped according to the givenness of the DO and the givenness of the IO. The tables containing the raw numbers can be found in the appendix (tables A1 and A2).

Figure 5: Distribution of object orders in adult and children, in the prototypical-animacy condition



The statistical analysis was set up as follows. We used a linear mixed effects model (Bates, Machler, Bolker, & Walker, 2015), and set up the contrasted conditions based on the givenness of the DO: DO-G and All-G were grouped together (DO-GG), and No-G and IO-G were grouped together (DO-nG). In the following tables, then, the first line below the intercept indicates the comparison of the two conditions in which the DO is given (DO-GG), to the conditions in which the DO is not given (DO-nG). Following that, the conditions within DO-GG and DO-nG respectively are compared in order to establish whether the givenness of the IO plays a role. The participant and set ('give' and 'offer')

were set as random effects. This model was conducted on the data of both groups together. The intercept is the distribution of the two object orders in adults.

Table 7: Summary of the model of the responses in the IO-animate condition

	Estimate	**Standard error**	**p-value**	**Significance**
Adults all (Intercept)	2.6135	1.3079	0.045	p<0.05
Adults DO-GG v DO-nG	1.6445	0.5933	0.0055	p<0.01
Adults DO-G v All-G	1.1505	0.4675	0.013	p<0.05
Adults IO-G v No-G	0.3192	0.3589	0.373	-
Children All	-3.4724	0.9508	0.00026	p<0.001
Children DO-GG v DO-nG	-2.2136	0.7300	0.00243	p<0.01
Children DO-G v All-G	-1.2283	0.5602	0.0283	p<0.05
Children IO-G v No-G	0.0259	0.4601	0.955	-

The significance obtained in the intercept indicates that the adults favour one object order over the other: the value in the estimate is positive, which entails that the object order preferred by the adults is DO-IO.

Next, the conditions where the DO is given (DO-G and All-G) and where it is not given (No-G and IO-G) were compared: the statistical analysis confirms that the two object orders differ in their proportions, based on the givenness of the DO (p<0.01). By examining the proportions of the object orders in the conditions within DO-GG and DO-nG, we can establish whether the givenness of the IO has any impact on object order in the current task. Consequently, the givenness of the IO is relevant when the DO is also given, as the amount of DO-IO orders decreases significantly, when compared to the

condition where only the DO is given ($p<0.05$); however, the givenness of the IO does not influence the proportion of word orders when the DO is not given (IO-G vs No-G).

When the overall distribution of object orders in the child data is compared to the one in the adult data, we can see that they are significantly different. The (-) sign in the estimate indicates that the preference is opposite than the one seen in the adults: children prefer IO-DO.

Moving on to the more fine-grained differences, when we compare the distribution of word orders with the DO given and the DO not given, we can see that the effect givenness has on word order in children is not the same as in the adults. The (-) sign in the estimate indicated that there is a decrease of DO-IO orders in the conditions in which the DO is given, when compared to the conditions when it is not given. Like in the adult data, the givenness of the IO has an effect within the DO-G group, but differently than in the adult data, its effect consists in a higher proportion of DO-IO with respect to the when only the DO is given. With regard to the last contrast, between No-G and IO-G, there is no difference, like in the adult data, meaning that the givenness of the IO does not influence object order once the DO is not given.

As predicted, children have a preference for IO-DO, and this stays fairly constant throughout the task. The adults use both object orders equally, with the exception of the DO-G condition, where the DO-IO is clearly preferred. Both groups show sensitivity to the given DO, the adults act target-like and produce more DO-IO, while the children use the least DO-IO orders when the DO is given.

5.4 Balanced animacy condition

This condition has considerably fewer observations (n=191 in total) than the previous condition, due to both this condition only including one set of images, and a higher rate of NA data. One reason for this is the possibility of using a PP. Another reason, limited to children, was referent inversion (seen section 5.1)

It has been stated in the predictions that the effect of givenness on word order will be clearer in this condition, because the animacy of the two objects has the same value. Surprisingly, the adults produced only DO-IO orders, with only one exception of IO-DO order.

Therefore, when both objects are animate, the only word order used is DO-IO, and there is no observable givenness effect. The raw numbers and percentiles are provided in the appendix (tables A3 and A4). This is a limitation of the task, and the possible reasons will be presented in the discussion. Because of this distribution of responses, there is no use in conducting a statistical test on the adults[10].

We can nevertheless compare the distribution of the data in the two animacy conditions, which will reveal whether the increase of DO-IO productions is significant. The model is set up without regard to the givenness conditions, as givenness obviously did not have an effect in the both-animate condition, and the effects of givenness were already discussed for the IO-animate condition in the previous section.

[10] The DO-IO preference we observed here is in accordance with the results of an acceptability judgment task obtained by Velnić (submitted), which showed that when the animacy was neutral, DO-IO orders were preferred to IO-DO.

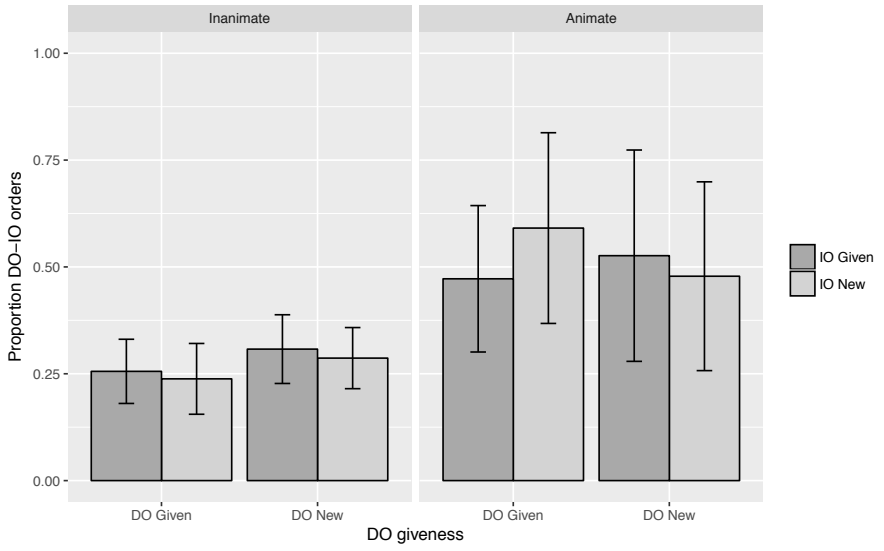
Table 8: Summary of the model for adult responses in the two animacy conditions.

	Estimate	**Standard error**	**p-value**	**Significance**
IO animate	0.9613	0.3501	0.006	p<0.01
Both animate	4.4766	1.0824	$3.54e^{-05}$	p<0.001

From table 8, we can see that the adults already have a preference for DO-IO in the prototypical animacy condition; however, this preference increases significantly when the DO is also animate.

We will go into more detail with the children's responses. In figure 6 the responses in the two animacy conditions are compared and the graph reveals that the trend in responses is different than in the prototypical animacy condition, as the IO-DO no longer dominates the children's productions. Moreover, the DO-G condition now has the highest proportions of DO-IO productions, unlike the previous condition, when the DO-IO productions were significantly decreased.

Figure 6: Comparison of the distribution of object orders in the child data, between the condition with an inanimate DO (prototypical) and the condition with an animate DO (both animate).



We have thus set up a comparison model of the two animacy conditions, but, unlike the setup for the adult data, the model for the child data takes the givenness conditions into account (table 9). The givenness contrasts were set up as previously. The intercept is the children's responses in the prototypical animacy condition.

The significance in the intercept indicates a preference towards one object order in the IO-animate condition. This preferred object order is IO-DO, as the estimate has a (-) sign; this was also seen in the previous section, when the productions of the two groups of speakers were compared. Furthermore, we can see that the production of DO-IO significantly decreases when we compare the conditions with a given DO to the conditions where DO is not given. The givenness of the IO does not seem to be of any relevance, as the two subsequent comparisons do not come out as significant.

The comparison of the data in the two animacy conditions reveals that children use significantly more DO-IO when both objects are animate. Moreover, the comparison of the DO-GG and DO-nG is almost significant ($p<0.1$), entailing that the DO-IO increases in conditions of given DO, contrary to what happens when only the IO is animate. The reason why this interaction is not significant might be due to the reduced amount of data elicited for the both-animate condition; thus, if the conditions had had an equal amount of sets, the result of this interaction would most likely have been significant. Again, the givenness of the IO does not seem to play a role.

Table 9: Summary of the model for children's responses in the two animacy conditions, with relation to givenness

	Estimate	**Standard error**	**p-value**	**Significance**
IO-animate (Intercept)	-1.4135	0.26244	7.20e-08	p<0.001
IO-animate DO-GG v DO-nG	-0.9289	0.4725	0.0493	p<0.05
IO-animate DO-G v All-G	-0.2025	0.3531	0.5663	-
IO-animate IO-G v No-G	0.3472	0.3103	0.2632	-
Both-animate	1.6436	0.3106	1.22e-07	p<0.001
Both-animate DO-GG v DO-nG	2.0227	1.1289	0.0732	p<0.1
Both-animate DO-G v All-G	0.6487	0.773	0.4013	-
Both-animate IO-G v No-G	0.0057	0.8124	0.9943	-

The results reveal that both children and adults are attentive to animacy, as the proportions of DO-IO orders significantly increase. The model set up for the child data reveals that children are more adult-like in taking givenness into account once animacy is no longer a factor (both-animate); this is apparent since the DO-GG conditions signal a given>new preference, and not a new>given preference as seen in the IO-given condition. The reasons for this will be further elaborated in the Discussion.

5.5 Omissions in the child data

Previous studies, such as Mykhaylyk et al. (2013) and Anderssen et al. (2014), found a significant amount of data related to givenness in the omissions. Since the production of object order does not signal sensitivity to givenness in the child data, we decided to check if the omissions are related to it.

Overall, the children have 58 object omissions, 42 of omitted elements being given. The adults did not have any omissions in the task. Table 10 shows this omission by element across the givenness conditions, the shaded values signal that the argument is given.

Most omissions occur in the All-G condition, and the IO has the highest omission rate (n=44). The most relevant omissions are DO and IO omissions in the DO-G and IO-G conditions, as these can signal whether the omission is related to givenness. Table 11 shows the distribution of these omissions along with the occurrences containing both objects. The shaded values signal an appropriate construction or omission in relation to givenness.

Table 10: Distribution of omissions in the child data

	No-G	DO-G	IO-G	All-G	Total
DO	1	2	2	9	14
IO	9	4	10	21	44
Total (omitted+overt)	154	108	126	171	559

Table 11: Distribution of word orders and omissions in DO-G and IO-G

	IO-animate		Both animate	
	DO-G	IO-G	DO-G	IO-G
DO-IO	23	38	12	10
IO-DO	60	56	4	5
Om DO	2	2	0	0
Om IO	1	7	3	3
Total appropriate productions	25	63	12	8

We can see that the omissions are marginal in the key conditions for this study, and we can make very few observations on the omission pattern. Firstly, the IO is much more prone to omission than the DO. This is not related to animacy, since the DO is not omitted more when it is animate. Overall, children omit slightly more given objects than new objects (12 vs. 6). However, these data are too scarce to suggest that children mark givenness through the omission of the given object, rather than through word order, as both strategies (the IO-DO order and the omission of the IO) show non-context related preferences.

6. Discussion

On the one hand, the data obtained from the task indicates a givenness effect on object ordering confined to the given DO, and did not capture any effect on the adults when both objects were animate. This could entail that our task failed to capture the givenness relation between the objects, and we will discuss the possible methodological limitations that could have caused this here. On the other hand, animacy appears to be a relevant factor for both types of speaker. The study also finds that adults have a strong preference for DO-IO, while children over-produce IO-DO due to animacy, but also seem to have a less pronounced, preference for DO-IO.

The first research question ('Do adults use different word orders to mark the different givenness conditions of the two objects?') was about the relation of givenness to word order in adults. We expected the adults to conform to the given>new principle, but we found an effect only when the DO was given. The balanced animacy condition displayed only DO-IO productions, and consequently, no givenness effect could be noticed there.

A possible reason for finding a limited givenness effect in the adult controls is that the task may have failed to distinguish between given and new elements. Perhaps the adults did not believe that the experimenter did not know which images she was taking out of the bag. In that case, they might have perceived everything as given, and thus did not have the need to mark givenness distinctly.

For the second research question ('Do children use different word orders to mark the different givenness conditions of the two objects'), we have predicted that, due to the possible preference for IO-DO, the givenness effect will be most noticeable in the DO-G condition. As in the adults, this is exactly what we have found. Children and adults, however, act differently with regard to this condition, as the former decrease their DO-IO productions (indicating a new>given preference), while, in the case of adults, the DO-IO productions increase, as was expected. In the balanced animacy condition, the DO-G condition continues to differ from the rest of the conditions. However, here we find a marginal given>new preference. The marginal effect is due to a reduced number of data points, and it would probably have been more significant if less data had been lost. The IO-G condition never differs from the baseline.

The next research question was whether there is a clearer effect of givenness when animacy is neutralized. We have predicted that the effect of givenness will be clearer when animacy is neutralized; this is, after all, the proper way to fully observe the effect of a factor. This prediction was however not borne out, as there was no givenness effect to be observed in the adult data since the DO-IO production is at ceiling level. For the children, we notice a significant change in the word order preference from IO-DO to DO-IO, and a more adult-like performance, if compared to the adults' production in the IO-animate condition (already discussed above). Nevertheless, we must consider the

answer to this inconclusive, and a new setup is needed in order to provide an unambiguous answer.

Regarding research question four, ('Do children and adults differ in their object order preferences in ditransitive structures?'), adults and children do seem to behave differently, as they seemingly have different object order preferences: the former prefer DO-IO, while the latter favour IO-DO. Adults prefer DO-IO, especially in the both-animate condition, where this is in fact the only word order produced. This tendency was also found in Velnić (submitted), when animacy or both animacy and givenness were neutral. The children's preference for IO-DO is limited to the condition of prototypical animacy, which is the one found in naturalistic data. The preference for IO-DO has also been found in other studies (Höhle et al., 2014; Mykhaylyk et al., 2013) and it had led us to predict that Croatian children will display the same tendency. In the balanced condition, the children were more adult-like, as they produced DO-IO 52% of the time. This brings us to the discussion of animacy.

Our next research question was about the animacy effect. Both children and adults had a significantly stronger preference for DO-IO when the DO was also animate. This confirms our prediction that animacy influences both types of speakers.

Research question six regarded animacy and whether it had a different effect on children than on adults. In accordance with the findings in Snyder (2003), we predicted that animacy would have a stronger effect on children. Our results deserve a thorough discussion on this matter.

The results suggest that animacy is a strong factor for determining word order in both types of speaker, and this is not in line with our predictions, as we expected animacy to be a stronger factor in children than in adults. The results can, however, be attributed

to an interaction of animacy with the different object order preferences in adults and children. More precisely, and in light of other data on Croatian, such as the acceptability judgment results obtained by Velnić (submitted), it is obvious that the preferred word order of adult speakers is DO-IO. So, since animacy influences object order choice, when the IO is animate, the adults produce their preferred order and the animate-first order in equal proportions. The production of DO-IO is increased with givenness in favour of the DO (DO-G condition), and then returns to the initial distribution, which is an interaction of word order preference and animacy of the IO. The givenness of the IO does not seem to be considered.

When animacy is no longer a factor (both-animate), adults produce DO-IO at ceiling level, as their word order preference is the only ordering mechanism that surfaces. The reason for this is open for discussion, since we expected adults to be the group that takes more factors (in our case givenness and animacy) into consideration when ordering the arguments. It nevertheless seems, contrary to any prediction, that adults choose based on the pragmatic availability of their preferred order, and that, once free from animacy constraints, they use that order exclusively. It is peculiar that givenness is completely ignored here, but we have already mentioned that this might be due to a task effect in which the adults considered all referents as given. If that is the case, animacy is the only factor tested on adults, and it has an effect that we have already discussed.

For the children, naturalistic data from Croatian suggests that IO-DO is the more frequently produced object order (Kovačević, 2004; Velnić, 2014). This is not strictly an indication of their preference for this order, since child-directed speech also contains a majority of IO-DO (Velnić, 2014). But taking into consideration other studies that have

also found this preference (Höhle et al., 2014; Mykhaylyk et al., 2013), we have predicted a preference towards IO-DO.

Let us, then, first outline the children's behaviour in our task, and see whether there really is a preference for IO-DO. In the IO-animate condition, children produced mostly IO-DO, because it is the more appropriate object order from an animacy perspective, to which we know children are attentive. The production of DO-IO significantly increases when animacy is balanced, entailing that it is a very relevant factor. If IO-DO was really their preferred order, it could have been used unvaryingly across the task, since its use is still appropriate from an animacy perspective. Here, the children also show a givenness effect similar to that observed in adults for the prototypical animacy condition, as the DO-G condition has more DO-IO productions than the other givenness conditions. Perhaps, once animacy is balanced, children have more cognitive capacity to integrate givenness in their word order choice. This is only a speculation, and there is no way of proving this based on the current data.

However, children do not reach ceiling level in any condition, as adults do in the balanced animacy condition. The data suggests that children do not prefer IO-DO, and are aware of the underlying status of the DO-IO, but are not yet adult-like. If they relied only on the appropriateness of the IO-DO, they could have used it consistently throughout the task. Thus, the predominant productions of IO-DO, seen in the naturalistic data and in some of the experimental studies cited here, are due to the animacy imbalance and children being very sensitive to it. Once that is removed, children speakers are freer to vary their productions and be more similar to the adults. To conclude, the object order choice we see in the task is an interaction of preferred object

order and animacy, and animacy seems to have a stronger effect on children than on adults, which is in line with what Snyder (2003) had found.

This means that the results obtained with regard to object order preference are due to an animacy imbalance which occurs in ditransitives prototypically. This is to be expected in naturalistic data. However, also the studies cited in section 2.3 that have not found a clear givenness effect, but rather an object order preference (Höhle et al., 2014; Mykhaylyk et al., 2013) have used the prototypical animacy. Thus, their results are most likely affected by the children's attentiveness to animacy and are an indication of children respecting the animate-first principle, rather than having a preference for IO-DO.

7. Conclusion

This study set out to explore the effects of givenness and animacy in ditransitive sentences of Croatian pre-school children. We found a strong animacy effect in both types of speakers, although children rely on animacy more than adults. An effect was also found for givenness, but limited to the condition in which the DO was given. Both types of speaker were more attentive to the DO being given, compared to the IO. This was a predicted result for the children (but not for the adults), as we expected them to take givenness of all the arguments into consideration. The reasons for which the givenness of the IO does not trigger an effect of word order are yet to be investigated.

We have also discovered that adults prefer DO-IO, while children tend to use more IO-DO, but do not have a strong preference for that object order. In the child data, there is an over-production of IO-DO when the IO is animate, but once animacy is balanced, the proportion of the two word orders is in favour of DO-IO. The predominance of IO-

DO productions in naturalistic data is due to the IO being animate and the DO being inanimate. This study shows that once animacy is no longer a factor, the DO-IO preference starts to surface. This suggests that children are very attentive to animacy, but that their word order preference is underlyingly adult-like. If their preference for IO-DO was as strong as the adults' preference for DO-IO, IO-DO would be the only object order produced in the task. We thus conclude that children are more attentive to animacy than adults.

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Appendix

Table A1: Second possible order of images for 'give'.

	Given	Action	Direction
1	No given	Fox gives flower to duck	S>DO>IO[11]
2	S	**Duck** gives apple to cat	IO<DO<S
3	S & DO	**Duck** gives **flower** to horse	S>DO>IO
4	S & IO	**Fox** gives cake to **horse**	S>DO>IO
5	All	**Fox** gives **apple** to **cat**	S>DO>IO

Table A2: Second possible order of images for 'offer'.

	Given	Action	Direction
1	No given	Lion offers carrot to pig	IO<DO<S
2	S	**Pig** offers lollipop to zebra	IO<DO<S
3	S & DO	**Pig** offers **carrot** to monkey	IO<DO<S
4	S & IO	**Lion** offers sandwich to **monkey**	S>DO>IO
5	All	**Lion** offers **lollipop** to **zebra**	S>DO>IO

[11] This image was originally supposed to have IO<DO<S order and it was illustrated that way, but during the printing process it was reversed and printed as a mirror image, resulting in the inverse orders of the participants.

Table A3: Second possible order of images for 'send'.

	Given	Action	Direction
1	No given	Bunny sends parrot to turtle	S>DO>IO
2	S	**Turtle** sends puppy to elephant	S>DO>IO
3	S & DO	**Turtle** sends **parrot** to snail	S>DO>IO
4	S & IO	**Bunny** sends mouse to **snail**	IO<DO<S
5	All	**Bunny** sends **puppy** to **elephant**	IO<DO<S

Table A4: Distribution of the adult responses in the IO-animate condition.

	No-G	**DO-G**	**IO-G**	**All-G**
DO-IO	59% (82)	80% (56)	63% (45)	64% (43)
IO-DO	41% (58)	20% (14)	37% (26)	36% (24)
Total	348			

Table A5: Distribution of the children's responses in the IO-animate condition.

	No-G	**DO-G**	**IO-G**	**All-G**
DO-IO	29% (45)	24% (25)	31% (40)	26% (34)
IO-DO	71% (112)	76% (80)	69% (90)	74% (99)
Total	525			

Table A6: Distribution of the adult responses in the both-animate condition.

	No-G	**DO-G**	**IO-G**	**All-G**
DO-IO	97% (36)	100% (16)	100% (20)	100% (18)
IO-DO	3% (1)	0%	0%	0%
Total	91			

Table A7: Distribution of the children's responses in the both-animate condition.

	No-G	**DO-G**	**IO-G**	**All-G**
DO-IO	48% (11)	59% (13)	53% (10)	47% (17)
IO-DO	52% (12)	41% (9)	47% (9)	53% (19)
Total	100			