Production of relative clauses in monolingual Turkish children[*]

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1. Background

Research on the production of relative clauses (RCs) in English has shown that although children start using intransitive RCs at an early age, more complex object RCs appear later (Hamburger and Crain, 1982; Diessel and Tomasello, 2005), and children use avoidance strategies, such as conjoined clauses and resumptive pronouns (Crain, McKee, and Emiliani, 1990; McKee, McDaniel, and Snedeker, 1998; McKee and McDaniel, 2001).

To date, it is unclear whether or not the same picture emerges in Turkish, a language with an SOV word-order and overt case marking. Some studies suggested that subject RCs are more frequent in adults and children (Slobin, 1986) and yield a better performance than object RCs (Özcan, 1996), but others have reported the opposite pattern (Ekmekçi, 1990). We recently demonstrated that Turkish children show higher accuracy in the comprehension of subject than object RCs (Özge, Marinis, and Zeyrek, 2009). The present study complements our previous study by investigating the production of RCs in Turkish children and adults and uses participants' responses to account for the emerging asymmetry between subject and object RCs.

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2. Turkish and Turkish RCs

Turkish is a head-final language; heads follow their arguments. SOV is accepted as the canonical word order although it flexibly allows all six variations in line with discourse. Both subjects and objects can be dropped depending on the context. It has relatively rich verbal morphology, grammatical categories (e.g., Tense Aspect Modality); some syntactic constructions (e.g., relativization, complementation, and passivization) involve suffixation on the verb, and there is overt case marking on non-subject NPs and sentential complements.

In Turkish RCs, the modified head always appears in the right-most head position. There are two participle suffixes that relativize[1] object (-DIK)[2] and subject (-(y)An)[3] RCs. To relativize the object NP, the -DIK morpheme is used as a relativizer, the subject is marked with the genitive case, and the relativizing participle is followed by a possessive suffix marking the agreement with the subject (1). In subject RCs, relativization is carried out by the participle -(y)An with no extra morphology (2).

(1) Kedi-nin t_i kovala-dığ-ı   köpek$_i$
    cat-GEN t_i chase-DIK-3SG.POSS   dog$_i$
    'The dog the cat chased.'

(2) t_i Kedi-yi   kovala-yan   köpek$_i$
    t_i cat-ACC   chase-(y)An   dog$_i$
    'The dog that chased the cat.'

3. Method
3.1 Materials and Design

A novel elicitation task was designed to test the production of RCs in children and adults. We used 8 picture cards and 24 items to elicit subject and object RCs. Each card was divided into four parts and consisted of four different pictures. Each picture in a card depicted the same pair of animals performing a different action. There were two sets of cards, one for the participant and one for the researcher, as shown in Figure 1. The former had some of the animals with accessories such as a hat, a bag, a tie, or a hairclip, whereas the animals in the latter card had no accessories.

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[1] We use the term 'relativize' to refer to the process of modification; when the head noun is the subject of the RC we use the term 'relativizing the subject' and we use the term 'relativizing the object' when the head noun is the object of the RC.
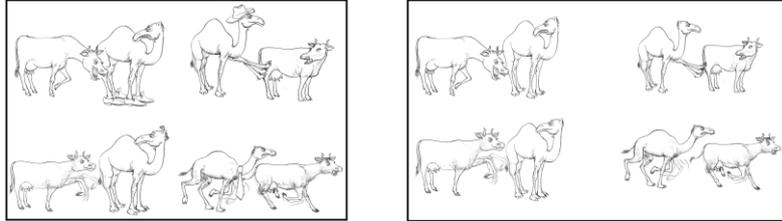[2] The parts of suffixes that vary in line with the rules of vowel harmony and consonant alternation are shown in capital letters.
[3] The initial consonant 'y' of the subject relativizing morpheme -(y)AN is in brackets to indicate that it can be dropped in certain contexts.

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Figure 1: Sample cards for the elicitation task
A: Participant's card   **B: Researcher's card**

Accessories were used as a means to elicit RCs. The aim of the task for the participant was to describe which animal was wearing which accessory to help the researcher identify the correct animal in her own card.

The task was designed as a game as it aimed to elicit RCs in a communicative and felicitous way without tapping into meta-linguistic knowledge. Only three of the four pictures in each card were used to make the task felicitous (i.e., to provide the child with a real purpose to describe each picture).

The task included 8 animals and 8 action verbs in total, each of which was repeated two to five times throughout the task. All lexical items to be elicited were controlled for morpheme length, imageability, frequency, and age of acquisition using an English database (Bird, Franklin, and Howard, 2001). Also, we coupled animals of similar size to prevent bias from animal size. Finally, the number of times each accessory appeared was controlled as well as whether it appeared on an agent or a patient referent.

3.2 Participants

36 monolingual Turkish children aged 5-8 (M = 6.7, SD = 1.09) participated in this study. The children were divided into two groups: 16 younger (M = 5.6, SD = 0.5) (8 female, 8 male) and 20 older children (M = 7.6, SD = 0.4) (11 female, 9 male). All younger children attended kindergarten and all older children attended primary school. All children were reported to be neurologically intact with no behavioural, cognitive, or psychological problems, and all children had normal or corrected to normal vision. 22 undergraduate students of the Middle East Technical University served as a control group. Turkish was the first language of all participants.

3.3 Procedure

Children were tested individually in a quiet room allocated for this research in their school. They were shown the cards and were informed that the researcher had a different set with no accessories. Participants were instructed

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to hold each of their cards without showing it to the researcher and try to describe the animal with a particular accessory in line with the question asked by the researcher so that the researcher could identify the animal with the correct accessory on her card. The task was always initiated by a 'who question' for the first item followed by a 'which question' for the rest of the items until the task ended. The researcher paid special attention to keep the instruction language simple and consistent. Example 3 illustrates a likely dialogue between the researcher and participants. Elicitation of subject and object RCs was pseudo-randomized and all participants were exposed to the same set of elicitation questions in the same order.

(3) Sample dialogue between the participant and the researcher
Researcher: Hangi   deve   şapka tak-mış?
            Which   camel   hat   put-EV.COP
            'Which camel is wearing the hat?'
Participant: İneğ-i   tekmele-yen deve.
             Cow-ACC   push-(y)An   camel
             'The camel that is kicking the cow.'
Researcher: Hangi   deve   ayakkabı giy-miş?
            Which   camel   shoe   wear-EV.COP
            'Which camel is wearing the shoes?'
Participant: İneğ-in   tekmele-diğ-i   deve.
             Cow-GEN   kick-DIK-3SG.POSS   camel
   'The camel that the cow is biting.'

The task was designed in such a way to lead the child to use the target structures. First, the animals taking part in each activity in each picture were almost the same except for the activities they were involved in and their theta role (i.e. whether they took part in the activity as an agent or a patient). Secondly, the child was reminded that the order of the animals might change in the researcher's card and s/he would not be able to see the card the child was holding, so answers such as 'the first dog' would not be acceptable. Finally, the child was also advised to focus on the activities performed rather than the physical features of the animals. These rules were made clear before the task and were repeated during the task if the need arose. Apart from this, no negative feedback was given upon the production of any kind of responses. That is, the child was always praised for being very cooperative and motivated but not for the correctness of her/his responses. Children's responses were both recorded and written down by the researcher.

4. Results

We first conducted a preliminary repeated measures ANOVA with the factor Group (kindergarten, primary-school children) to investigate differences between younger and older children. This showed no differences between the
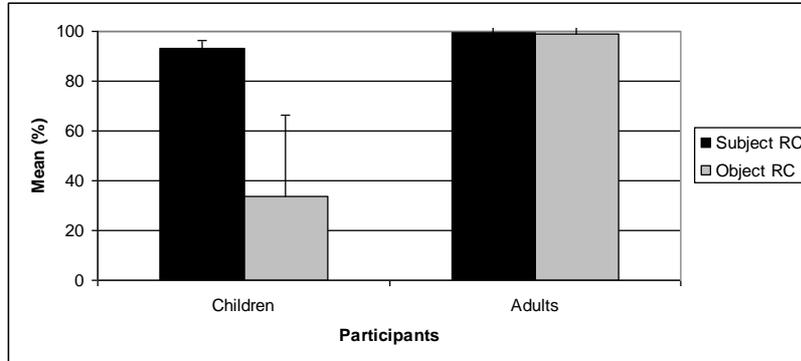
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groups in the use of RCs (F (1, 35) = 1.54, p > .1), and therefore, the two groups were collapsed into one for further analyses. To investigate differences between children and adults in the use of subject and object RCs, we conducted a repeated measures ANOVA with the factors Group (children, adults) and RC-Type (Subject, Object). This showed that children used fewer RCs than adults (F (1, 58) = 7.54, p < .001), and both groups used fewer object than subject RCs (F (1, 58) = 22.46, p < .001), but there was no Group by RC-Type interaction (see Figure 3).

Figure 3: Use of RCs out of all responses (in percentage)
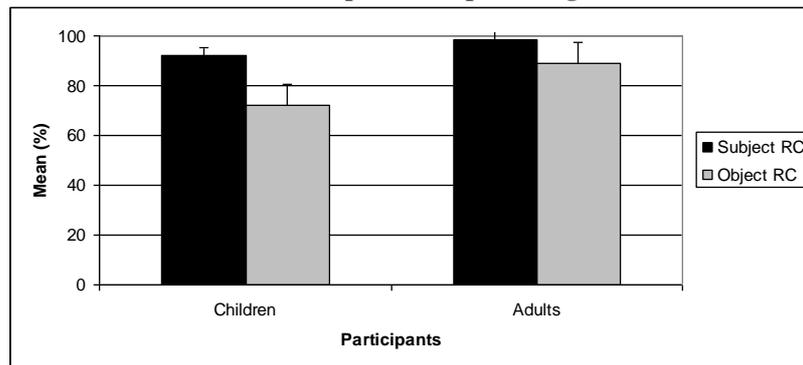
To investigate possible differences between the two groups and the two RC Types on the rate of grammatical RCs out of all responses, we conducted a similar ANOVA. This showed a main effect of Group (F (1, 58) = 77.25, p < .001), a main effect of RC-Type (F (1, 58) = 66.33, p < .001), and an interaction of Group by RC-Type (F (1, 58) = 64.6, p < .001) (see Figure 4). Pairwise comparisons using Bonferroni correction indicated that this interaction was due to the fact that children showed an asymmetry between subject and object RCs (p < .001) whereas adults did not (p > .1). In addition, children showed significantly lower performance in object RCs (M = 33.93, SD = 33.30) as compared to adults (M= 99.04, SD = 2.52) (p < .001). As for subject RCs, the difference between the two groups was not significant (children: M= 93.41, SD = 15.82; adults: M= 99.43, SD = 1.86; p > .05)

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Figure 4: Grammatical RCs out of all RCs (in percentage)

Although the task successfully prompted RCs most of the time, it also prompted conjoined sentences, as shown in (4), passives, as shown in (5), structures with perspective shift, as shown in (6), and structures with prepositional phrase, as shown in (7), which we will call *avoidance strategies*. Avoidance strategies were observed in both children and adults. Children and to a smaller extend also adults used RC-type reversals, i.e., subject RCs instead of object RCs, as shown in (8), which we will call *reversal errors*. In addition, children used responses that were pragmatically inappropriate, as shown in (9), which we will call *non-pragmatic responses*. Finally, they also used ungrammatical sentences that were not observed in adults. We will call these *ungrammatical responses* as shown in (10). Example (11) illustrates the target response for the attempts in (4) to (10).

(4) Conjoined Clauses (23.7%)
Hani   inek   o-nu   koval-ıyor   ya   işte   o   koyun
well   cow-NOM   he-ACC   chase-PROG   well   that's that   sheep
'You know the cow is chasing him, that is the sheep.'

(5) Passive Voice (1.2 %)
İt-il-en   koyun
push-PASS-(y)An   sheep
'The sheep that is pushed.'

(6) Perspective Shift (7.9 %)
a- İnek-ten   kaç-an   koyun
    cow-ABL   run-(y)An   sheep
    'The sheep that is running away from the cow.'
b- Şapka tak-an   koyun   inek-ten   kaç-ıyor
    hat wear-(y)An   sheep   cow-abl   run-prog
    'The sheep wearing a hat is running away from the cow.'

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(7) Prepositional Phrases (2.6 %)
    Koş-an   ineğ-in   ön-ün-de-ki   koyun
    run-(y)An cow-GEN   front-POSS3sg-dat-rel   sheep
    'The sheep that is in front of the cow that is running.'

(8) Reversal Errors (15.83 %)
    Koyun-u   it-en   inek
    sheep-ACC   push-(y)AN   cow
    'The cow that is pushing the sheep.'

(9) Non-Pragmatic Responses (4.24 %)
    İnek   koyun-u   it-er-ken   şapka tak-mış.
    cow   sheep-ACC   push-AOR-CV   hat   put-EV.COP
    'The sheep wore the hat when the cow was pushing him.'

(10) Ungrammatical Responses (24.5 %)
    a- İnek   o-nu   it-en   koyun
       cow   he-ACC   push-(y)AN   sheep
    b- İnek   koyun-u   it-en   koyun
       cow   sheep-ACC   push-(y)AN   sheep
    c- İnek   it-en   koyun
       cow   push-(y)AN   sheep
    d- İneğ-in   koyun-u   it-tiğ-i   koyun
       cow-GEN   sheep-ACC   push-DIK-3SG.POSS   sheep
       'The sheep that the cow pushed the cow.'

(11) Target Response
    İneğ-in   it-tiğ-i   koyun
    cow-GEN   push-DIK-3SG.POSS   sheep
    'The sheep that the cow is pushing.

To investigate the rate of each response type in each RC-Type among children, we conducted a mixed repeated measures ANOVA with RC-Type (Subject, Object) and Responses Type (avoidance, reversal, non-pragmatic, and ungrammatical) as within subjects factors. This showed a main effect of RC-Type ($F (1, 35) = 161.38$, $p < .001$), a main effect of Response Type ($F (3, 108) = 10.11$, $p < .001$), and a significant interaction between RC-Type and Response Type ($F (3, 108) = 9.01$, $p < .001$). Multiple comparisons with Bonferroni correction between the five response types for each RC-Type showed that for object RCs the rate of avoidance strategies ($M = 35.05$, $SD = 28.85$) was significantly higher than the rate of role-reversals ($M = 15.83$, $SD = 18.67$) and non-pragmatic responses ($M = 4.24$, $SD = 11.47$) ($p < .05$). Ungrammatical responses constituted the second most frequent response type after avoidance strategies and the difference between ungrammatical responses ($M = 24.27$, $SD = 23.99$) and non-pragmatic responses ($M = 4.24$, $SD = 11.47$) was significant

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(p < .001). The difference between the avoidance strategies and ungrammatical responses did not reach significance (p > .05) but the difference between role reversals (M = 15.83, SD = 18.67) and non-pragmatic responses (M = 4.24, SD = 11.47) was significant (p < .001). For subject RCs, on the other hand, only the difference between avoidance strategies (M = 6.67, SD = 11.33) and role reversals (M = .72, SD = 2.09) reached significance (p < .05). The rate of ungrammatical and non-pragmatic responses for subject RCs was as follows: ungrammatical: M = 5.58, SD = 14.69, non-pragmatic: M = 1.80, SD = 8.84, respectively.

5. Discussion

Participants' overall attempts to use RCs show that the present task successfully taps the use of the target structure. There was no significant difference between younger and older children so we did not observe a developmental path in the age-range (5-8) we tested. Both children and adults used more subject than object RCs and children were less accurate in the production of object compared to subject RCs. These results are in line with Slobin (1986), Özcan (1996), and our study on the comprehension of subject and object RCs in children (Özge, Marinis, and Zeyrek, 2009), and show that Turkish children and adults are more likely to produce subject than object RCs and children are less accurate in the production of object compared to subject RCs.

The response analysis showed that children used more avoidance strategies in object RCs as compared to subject RCs. The adults also used avoidance strategies for object RCs but not for subject RCs; however, unlike children they did not use conjoined clauses or prepositional phrases, which are structurally simpler than RCs, but only passives and perspective shift. This suggests that children prefer structurally less complex constructions to replace the object RCs. Children also produced more role-reversal errors, non-pragmatic responses, and ungrammatical strategies in object than subject RCs. Adults did not use non-pragmatic or ungrammatical responses. Since children's non-pragmatic responses are not directly related to their syntactic development, we take these as another means of avoiding object RCs.

In all ungrammatical responses, except for (10d), children adopt -(y)An as an object relativizing participle. However, these responses cannot be simply considered as *reversal errors*. In these structures, in addition to using the wrong relativizing participle (i.e., -(y)An instead of -DIK), children made consistent changes regarding case marking (i.e., NOM instead of GEN) and word order (SOV instead of SVO). That is, whenever they used -(y)An as an object relativizer, they also omitted the genitive case and they tended to keep the canonical SOV order by inserting a resumptive pronoun or a full resumptive NP in the extraction site. Although they used a very limited number of resumptive pronouns in subject RCs, they did not use structures with the wrong case marking or relativizing strategy for subject RCs. We take this to indicate that

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they are already aware that there are distinct relativizing strategies for subject and object RCs and that although they have acquired subject RCs they have not fully internalized the morpho-syntax of object RCs. [4]

We suggest that the following multiple factors contribute to the asymmetry between subject and object RCs in Turkish: 1) frequency, 2) word-order, 3) multiple form-function mappings, 4) genitive possessive agreement, 5) perspective shift. Each one of these factors will be discussed in turn.

Frequency: subject RCs seem to be more frequent than object RCs in child-directed speech (Slobin, 1986). In the corpus analysed by Slobin, Turkish speaking children and adults used significantly less object than subject RCs. This is in line with our findings that both children and adults produce more subject than object RCs. The ratio of subject vs. object RCs in children may reflect the input s/he is exposed to.

Word-order: the word-order in subject RCs is OVS and preserves the canonical order of Turkish in terms of verb and object, i.e. OV, whereas the word-order in object RCs is SVO displaying a reversed word-order of verb object, i.e. VO. Children and adults may prefer subject RCs because they follow the canonical OV word-order. Children's use of resumptive pronouns or full resumptive NPs in the extraction site may also indicate that they tend to preserve the canonical OV word-order.

Multiple form-function mappings: the subject in an object RC appears in the genitive case. Genitive case has more than one function; apart from marking the subject in object RCs as in (12), it marks the possessor in possessive NPs as in (13) and the subject of complement clauses as in (14). In subject RCs, on the other hand, the object appears in the accusative case, which has a single and unambiguous function, i.e. it marks the direct object.

(12) İneğ-in   iç-tiğ-i   süt
     cow-GEN   drink-DIK-3SG.POSS   milk-NOM
     'The milk that the cow drank'

(13) İneğ-in   süt-ü
     cow-GEN   milk-3SG.POSS
     'The cow's milk'

(14) İneğ-in süt-ü   iç-tiğ-i-ni   gör-dü-m.
     cow-GEN milk-ACC   drink-DIK-3SG.POSS-ACC   see-PAST-1SG
      'I saw that the cow drank the milk.'

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[4] Due to space limitations, we cannot provide a detailed discussion of what the ungrammatical strategies suggest regarding the acquisition of Turkish RCs and language acquisition mechanisms in general. This issue is discussed in length in Özge (in progress).

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The lower performance on object RCs compared to subject RCs may reflect the multiple form-function mappings of genitive case. The more functions a linguistic item has, the more difficult it may become to select/activate in spontaneous speech.

Genitive possessive agreement: in object RCs, the possessive agreement morpheme follows the participle suffix –DIK and agrees with the subject which is marked with the genitive case, as shown in (1) and (11). Genitive possessive agreement appears in object RCs, but not in subject RCs. This makes object RCs more complex than subject RCs in terms of morpho-syntax. Indeed, Özge (in progress) shows that children fail to detect the ungrammaticality caused by omission of the agreement morpheme in possessive NPs and object RCs. We suggest that multiple form-function mappings and morpho-syntactic complexity may be the reason why Turkish-speaking children acquire the genitive case at a much later age than the accusative and the nominative case (Aksu-Koç and Slobin, 1985), and this may also contribute to the lower performance and late acquisition of object compared to subject RCs.

One point needs elaboration here. It is well documented that Turkish children acquire the genitive case as old as five-years of age. The age of the child participants in our study ranged between five and eight years, but the data did not reveal any significant effect of age. Interestingly, in their ungrammatical responses, children did not make errors of commission by using the genitive with the subject relativizing participle (e.g., NP-GEN verb-(y)An, ineğ-in öp-en) or errors of omission by using the genitive without the possessive-agreement suffix (e.g., NP-GEN verb-DIK, ineğ-in öp-tük). Once they managed to employ the genitive case in object RCs, they were 100% correct in using -DIK and possessive agreement morphology. This indicates that children have acquired the genitive possessive agreement required to produce object RCs.

Perspective shift: perceptual features of the present task may have contributed to the participants' better performance in subject compared to object RCs. In line with MacWhinney (1977), we assume that the prompting question in our task provided a starting point for the participants by focusing their attention on the agent in the subject RC and on the patient in the object RC. According to MacWhinney, starting points may function to assign: (a) the attentional focus, (b) the perspective, (c) the agent, and (d) the given. Moreover, a starting point is always expected to be an active element (i.e. the agent). If a starting point does not coincide with the agent, a conflict arises, which he calls a complex perspective. Let us analyze the dialogue between the researcher and the participants, as exemplified in (3) from this angle. Hearing the question that aims to prompt a subject RC (i.e., 'which camel is wearing the hat?'), the participants direct their attention to the camel that is wearing the hat. Note that there is no complex perspective here, since the starting point here is the agent (i.e., the camel is both wearing the hat and performing the action). In the case of an object RC, on the contrary, the referent to which the question (i.e., 'which camel is wearing the shoes?') draws the attention is not the agent of the action that is depicted in the picture, thereby causing a complex perspective. Thus, the

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task demanded perspective shift in object RCs, but not in subject RCs. This may also have contributed to the asymmetry between subject and object RCs.

To conclude, success in the production of RCs depends on the successful convergence of various factors at different linguistic and non-linguistic (e.g., perceptual and conceptual) levels. These factors seem to be affecting children and adults at different rates. Our data show that children have acquired the structural means to produce RCs. The higher rate of avoidance on object RCs in children and their error types suggest that they may not have internalised fully the structural means of object relativization.

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