The development of passive and reflexive interpretation of non-active voice morphology in L1 Greek

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Abstract: Modern Greek (MG) non-active voice forms without a ‘by’ PP phrase are ambiguous between the reflexive/non-reflexive interpretation (Tsimpli, 2005b) since there is no one-to-one correspondence between voice and diathesis (Tzartzanos, 1996). This paper discusses Greek L1 children’s mastery of the reflexive/passive interpretation of non-active verb forms with [+| animate syntactic subjects. It examines reading preferences (reflexive/passive) of non-active structures based on ‘inherent’ verb properties. Finally, it investigates the availability of voice alternations in contexts of non-active structures containing actional verbs.

Key words: L1 acquisition, meaning underspecification, non-active voice, ‘by-phrase’, voice alternations

1. Non-active voice verbs with [+| animate syntactic subjects and the diathesis-voice mismatch

As illustrated in (1), non-active verb forms with [+| animate syntactic subjects are ambiguous between the passive and reflexive meaning in the absence of a (PP) “by-phrase.

(1) To arkoudaki plithik the bear-NOM watered-PA-3s
   a) mono tou/ by itself [reflexive reading]
   b) apo ti mama tou/ by its mum [passive reading]

In adult MG, the ‘by’-phrase following the non-active predicate resolves the ambiguity as it receives the external argument theta-role from the passive affix in sentences with a passive diathesis (1b), while in sentences with a reflexive interpretation (1a) the PP phrase emphasizes the reflexivity -being an adjunct predicate (Tzartzanos, 1996).

The paper examines whether children have adult-like performance in taking into consideration the (PP) ‘by- phrase’ to successfully interpret sentences, and whether factors like verb class affect their interpretive choices. Voice alternation availability and syntax-based performance is also checked, since a passive and, even, a reflexive meaning can be conveyed with active voice verb forms in MG, due to the flexible word order of the language.

2. Accounts on the acquisition of the passive

Some studies (Borer & Wexler1987, 1992) report non-mastery of verbal passives by 3-4 year olds, suggesting that the problem lies in the lack of the A-chain formation mechanism, which they assume to mature around 5. On the other hand, Demuth (1989) reports mastery of structures containing passive and raising forms (which involve A-chains) by 2;8 Sesotho children. Maratsos et al’s (1985, Maratsos & Abramovitch, 1975) results for L1 English well agree with Demuth’s. Fox & Grodzinsky (1998) for L1 English identify the problem in the ‘by-phrase’ of only the mental passives and, in particular, in the theta-transmission of the external theta-role from the passive affix to
the object of the ‘by-phrase’. Tsimpli (2005a,b) for Greek supports a syntax-driven child grammar, which contains information about the voice – diathesis mismatch and the meaning underspecification of non-active voice verb forms.

3. The experiment
An experiment was conducted in order to investigate: a) whether 3-4 year olds have mastered the meaning underspecification of the non-active voice affix, which involves ability to disambiguate between the reflexive and the passive interpretation of non-active voice verbs with [+ animate subject and a follow-up ‘by-phrase’, b) whether the notion of voice is acquired and c) how semantics (‘inherent verb properties’) play a role -if any- in children’s interpretative choices.

To achieve this, a truth-value judgment task was designed to elicit comprehension and production data. Children were exposed to stories1 acted-out by animal puppets, followed by a test sentence each. A puppet –spectator, which attended the stories along with each child, commented on the main event of the story providing, thus, the test sentences. The participants were asked to judge the grammaticality and truth-value of the test-sentences and produce target answers in case the stimulus-sentences were ‘false’. Target performance of the participants required rejection of all the test-sentences as ‘false’ and speech production to correct their falsity. The experimental hypothesis was connected with a ‘no’ response to check target interpretation, ensure that the target answer was given for the correct reason and elicit speech production.

For this purpose, five actional, non-active, 3rd person singular, past tense verbs in the perfective aspect, with animate syntactic subjects were slotted in 3 types of stimulus-sentences with: passive, reflexive and active reading in contexts such as (2), (3), (4):

(2) το αρκούδι βάφτηκε μόνο του
the bear-NOM painted-PA-3s self its (stimulus-reflexive / target-passive)
(3) το αρκουδάκι βράχηκε από το σκύλο!
the bear-NOM watered-PA-3s by the dog-ACC (stimulus-passive / target-reflexive)
(4) ο σκύλος βάφτηκε από το λαγό
the dog-NOM painted-PA-3s by the rabbit-ACC (stimulus-passive / target-active)

4. Participants
The test was given to a total of thirty pre-school children of two age groups. The first group (PS-1) involved fifteen 3-4 year old children with mean age 3;8; the second group (PS-2) consisted of fifteen 5-6 year old children with mean age 5;9.

Each child was occupied in an interview-game for a total of about 75 minutes. Before the actual testing, the PS-1 children received training both as a class and individually, for they were not acquainted with “puppet show” plays and initially showed reluctance in following the conventions of the play.

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1 Story 9: In this story the turtle does not feel good due to the hot weather and asks her friend, the dog, to help her some way. After some thought, the dog showers the turtle with a hose. The turtle feels refreshed and thanks the dog. The pig-puppet commends: “I know what happened in the story. The turtle ‘got-wet’ by itself. What do you think really happened?”.

The target answer expected from a child who knows the principle, is the rejection of the puppet’s statement as incorrect and the production of the target passive sentence “the turtle got-wet by the dog” or of a sentence with active morphology but with the same target interpretation; for example “the dog wet the turtle”. The choice between active /non-active voice is available in Greek due to the rich inflectional system and the relatively free word order.
5. Results

5.1. Target answer comprehension and production scores

Table 1: Comprehension: Target responses for PS-1 & PS-2 per target interpretation

<table>
<thead>
<tr>
<th>subjects</th>
<th>Target-Active</th>
<th>Target-Reflex.</th>
<th>Target-Passive</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS-1</td>
<td>49/75=65.3%</td>
<td>57/75=76%</td>
<td>61/75=81.3%</td>
<td>167/225=74.2%</td>
</tr>
<tr>
<td>PS-2</td>
<td>67/75=89.3%</td>
<td>71/75=94.7%</td>
<td>74/75=98.7%</td>
<td>212/225=94.2%</td>
</tr>
</tbody>
</table>

The results of the two groups of children (Table 1) clearly show a developmental trend towards target responses in all intended interpretations. It is interesting that both groups have best performance in target-passive sentences and worst in target-active meaning, which still gives high scores for the older group of children and above average for the younger. High target comprehension scores in the presence of non-truncated stimulus sentences with animate syntactic subjects means that children take into consideration the ‘by-phrase’; otherwise, we would expect random answers since the above structure, when truncated, is ambiguous between the reflexive and passive meaning.

Table 2: Production-Target responses for PS-1 & PS-2 per target interpretation

<table>
<thead>
<tr>
<th>subjects</th>
<th>Target-Active</th>
<th>Target-Reflex.</th>
<th>Target-Passive</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS-1</td>
<td>46/75=61.3%</td>
<td>48/75=64%</td>
<td>61/75=81.3%</td>
<td>155/225=68.9%</td>
</tr>
<tr>
<td>PS-2</td>
<td>67/75=89.3%</td>
<td>63/75=84%</td>
<td>74/75=98.7%</td>
<td>204/225=90.7%</td>
</tr>
</tbody>
</table>

The results in Table 2 show that there is a developmental trend towards the target reading for all three-reflexive, active, passive- interpretations. Similarly to the comprehension section, both groups achieved highest performance in the target-passive interpretation and the least good in the target-active. Comparing answers in the comprehension and production part of the experiment, comprehension reaches even higher scores for both groups of children.

5.2. Non-target responses / Error types

Non-target responses include answers with five types of errors (Table 3, 4). The errors reveal: a) problems with the comprehension and production of non-active voice structures and the ‘by-phrase’, b) difficulties only in the production of the ‘by-phrase’, c) problems with voice inflection, d) limitations in the use of semantically appropriate verbs and e) problems with the pragmatics of the ‘by-phrase’.

Table 3: PS-1: Distribution of types of non-target responses per reading

<table>
<thead>
<tr>
<th>PS-1</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive</td>
<td>9/10=90%</td>
<td>1/10=10%</td>
<td>0/10=0%</td>
<td>0/10=0%</td>
<td>0/10=0%</td>
</tr>
<tr>
<td>Reflexive</td>
<td>14/16=87.5%</td>
<td>1/16=6.25%</td>
<td>0/16=0%</td>
<td>1/16=6.25%</td>
<td>0/16=0%</td>
</tr>
<tr>
<td>Active</td>
<td>20/25=80%</td>
<td>4/25=16%</td>
<td>1/25=4%</td>
<td>0/25=0%</td>
<td>0/25=0%</td>
</tr>
</tbody>
</table>

Table 4: PS-2: Distribution of types of non-target responses per reading

<table>
<thead>
<tr>
<th>PS-2</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive</td>
<td>0/1=0%</td>
<td>0/1=0%</td>
<td>0/1=0%</td>
<td>0/1=0%</td>
<td>1/1=100%</td>
</tr>
<tr>
<td>Reflexive</td>
<td>0/3=0%</td>
<td>3/3=100%</td>
<td>0/3=0%</td>
<td>0/3=0%</td>
<td>0/3=0%</td>
</tr>
<tr>
<td>Active</td>
<td>5/5=100%</td>
<td>0/5=0%</td>
<td>0/5=0%</td>
<td>0/5=0%</td>
<td>0/5=0%</td>
</tr>
</tbody>
</table>
The results in tables 3 and 4 show that for the younger children there is some difficulty in understanding the meaning underspecification of non-active voice as most of the errors in all targeted interpretations were of type (a); a few children had problems only with the ‘by’-phrase (error-type: b). The distribution of errors is similar for PS-2 as regards the analogy of the types of errors, but in the older group non-target answers are minimal. Hence, a developmental trend in the acquisition of the dual meaning (reflexive/passive) of non-active verb forms with [+ animate syntactic subjects is detected.

5.3. Irrelevant answers

Table 5: Comprehension and Production: Irrelevant responses for PS-1 and PS-2

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Target-Active</th>
<th>Target-Reflex.</th>
<th>Target-Passive</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS-1</td>
<td>3/75=4%</td>
<td>6/75=8%</td>
<td>4/75=5.3%</td>
<td>20/225=8.9%</td>
</tr>
<tr>
<td>PS-2</td>
<td>3/75=4%</td>
<td>1/75=1.3%</td>
<td>0/75=0%</td>
<td>4/225=1.8%</td>
</tr>
</tbody>
</table>

Irrelevant responses mean that the children either did not understand the story or focused on other than the target event of the story, therefore they could not make a judgment on the test sentence. Both groups gave very low numbers of irrelevant responses.

The study of irrelevant responses (table 5) is necessary before reaching conclusions about the availability of the forms under investigation, in order not to distort the real picture of acquisition. Before assuming better mastery of passive structures than reflexives- based on scores, we should examine the rates of irrelevant responses in each target interpretation, as they reduce the number of target answers but they are not classified as non-target answers, because they do not denote erroneous performance on the part of the children with regards to the structure under investigation.

5.4. Production: voice distinctions in target responses

This section discusses voice preference (active/non-active) in the production part of the task. Voice preference is measured in the test, since MG has flexible word order and more than one voice can express the same diathesis, while ‘topic/ focus’ effects can be achieved without voice changes. For this purpose only target answers were counted.

Table 6: Target responses PS-1 and PS-2 (Stimuli: Non-active - Target: Active)

<table>
<thead>
<tr>
<th>Target responses</th>
<th>Active voice</th>
<th>Non-active voice</th>
<th>Non-active with ‘apo’</th>
<th>Non-active without ‘apo’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PS-1</td>
<td>77.6%</td>
<td>22.4%</td>
<td>54.8%</td>
<td>45.2%</td>
</tr>
<tr>
<td>Total PS-2</td>
<td>58%</td>
<td>42%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 7: Target responses PS-1 and PS-2 (Stimuli: Reflexive - Target: Passive)

<table>
<thead>
<tr>
<th>Target responses</th>
<th>Active voice</th>
<th>Non-active voice</th>
<th>Non-active with ‘apo’</th>
<th>Non-active without ‘apo’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PS-1</td>
<td>86.9%</td>
<td>63.3%</td>
<td>36.7%</td>
<td></td>
</tr>
<tr>
<td>Total PS-2</td>
<td>77.1%</td>
<td>22.9%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The results show a clear preference for active voice by both groups in target-active (table 6) and target-passive (table 7) meanings. Remember that the test sentences were in non-active voice, which is in support of the mastery of voice shift. As for the use of the ‘by’ phrase- in those of the responses given in non-active voice, there was at chance
preference for the full vs. the truncated\textsuperscript{2} passive for the younger children, while the older ones exclusively used full forms; hence there is a developmental trend in the incorporation of full non-active forms in speech production. No other than the target (‘apo’/by) preposition was used in any of the children’s responses.

| Table 8: Target responses PS-1 and PS-2 (Stimulus: Passive -Target: Reflexive) |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
|                                | Active voice    | Non-active voice | Non-active ‘apo’ | Non-active without ‘apo’ |
| Total PS-1                     | 7.1%            | 92.9%           | 97.8%           | 2.2%            |
| Total PS-2                     | 0%              | 100%            | 91.5%           | 8.5%            |

The results for target-reflexive sentences (table 8) depict a clear preference for non-active verb morphology with very high rates of use for both groups. Interestingly, the PS-1 group used the ‘apo’/by- phrase more than the PS-2 group. The low number of answers given in active voice, as opposed to the extensive use of active voice in the target-passive and active interpretations, has important implications for assumptions regarding the mastery of non-active voice. Note that active voice with reflexive interpretation is highly marked in adult Greek. To test the statistical significance of the results, a $X^2$ test was used in a ‘within group’ comparison of the voice preferred between target readings. In particular, it examined if the voice used was statistically significant when comparing target-active interpretation with target-passive, target-passive with target-reflexive and target-reflexive with target-active.

The results (table 9) show statistical significance in all types of comparisons for both groups, except for the case of target (T)-passive/ target (T)-active in the PS-1 group. More analytically, both PS-1 and PS-2 for the comparison between T-passive/T-reflexive and between T-active/ T-reflexive almost exclusively used active verb forms in T-passive and T-active reading, while non-active forms in the T-reflexive. This shows that children of both age groups have mastered non-active voice and are aware of voice alternations. The fact that they prefer to use active voice when target passive meaning is intended means that they are aware that the Greek system gives them this choice. The fact that both groups gave statistically significant results for the use of non-active voice in reflexives, when compared both to active and passive readings, means that children’s performance is not random, but describes a pattern of acquisition process which is characterized by mastery of voice alternations and non-active voice structures. Furthermore, it indicates that child language follows adult MG in considerations of markedness.

In the comparison between the T-passive and the T-active sentences, only the PS-2 showed statistically significant preference for active verb forms in T-passive meaning and for non-active forms in T-active. It is striking that active voice is of more frequent use in the target-passive reading than in the target-active, and it reveals mastery of voice alternations. PS-1 used active verb forms for both intended readings.

\textsuperscript{2} Note that in order to classify a truncated form as target, the experimenter first checked its “target status” with a subsequent question to clarify the diathesis which was assigned to the sentence produced by the child.
5.5. Inherent verb properties and target interpretation

Some traditional grammars classify verbs according to their “inherent” properties and assume that these properties affect target meaning and the choice of the voice used. For instance, ‘lerothike’ is considered anticausative (Alexiadou & Anagnostopoulou, 2004). The present study cannot support such a connection, since the verb ‘lerothike’ received low anticausative interpretation (13.3%). The verb ‘moutzourothike’ classified as anticausative, received high reflexive interpretation in stimulus-passive sentences (PS-1:80%, PS-2:100%). If prototypical reading played a role we would have low passive interpretation for the verb ‘plithike’, which is considered reflexive (Zombolou, 1997). Note that for the target-passive interpretation the test sentences have reflexive meaning, and despite that fact, children’s choice was not affected.

As for the relation between voice preference and target reading, no connection was found for the T-passive and T-active readings, since in both cases active voice was favoured. Only in the T-reflexive sentences non-active structures were preferred. As mentioned earlier, the decisions of the participants both relate to MG flexible word order and to what is considered a ‘marked’ choice in a language.

5.6. Anti-causative interpretation

This section discusses the anti-causative reading some participants assigned to test sentences. The test-stories/sentences, which received anti-causative interpretation, were counted separately from target answers, since the test did not intend to examine anti-causative interpretation. The anti-causative interpretation was of very low preference (5/225= 2.2% for both groups), but it still deserves a comment as it is revealing of the functions of the child brain.

Anti-causative interpretation for the PS-2 group was only assigned in two of the target-reflexive sentences, whereas the younger children apart from the two target-reflexive sentences assigned anti-causative interpretation to a target-passive sentence; this last case was a single instance. It is striking that anti-causative meaning was mainly given in sentences which aimed at deducing the reflexive reading. This finding is in line with Tsimpi’s (2005a,b) results where children assign anti-causative interpretation to target reflexive verbs. According to Tsimpi’s (2005b) theory of non-active voice, non-active structures with [+] animate syntactic subjects can receive a passive or reflexive interpretation and grammar does not distinguish between the passive and anti-causative meaning, which means that children’s interpretive choices in the present test are within the limits of grammar.

6. Discussion

The study’s results support the claim that children do not read the non-active affix as reflexive only, but are aware of its semantic underspecification. This claim is supported by the present study’s data according to which both groups achieved very high scores in

### Table 9: Within group comparison of voice morphology per target reading ($x^2$)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>PS-1</th>
<th>PS-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive/Active</td>
<td>(110) 5,106 P$^1$=.288 P$^2$=.298 P$^3$=.213</td>
<td>(141) 5,730 P$^1$=.017 P$^2$=.019 P$^3$=.013</td>
</tr>
<tr>
<td>Passive/Reflexive</td>
<td>(108) 65,427 P$^1$=.000 P$^2$=.000 P$^3$=.000</td>
<td>(137) 83,103 P$^1$=.000 P$^2$=.000 P$^3$=.000</td>
</tr>
<tr>
<td>Active/Reflexive</td>
<td>(90) 45,828 P$^1$=.000 P$^2$=.000 P$^3$=.000</td>
<td>(130) 52,388 P$^1$=.000 P$^2$=.000 P$^3$=.000</td>
</tr>
</tbody>
</table>
the comprehension and production parts of both target readings giving target-passive answers for stimuli-reflexive non-truncated forms, and target-reflexive answers for stimuli-passive non-truncated sentences.

Some problems with the ambiguity between the reflexive and the passive reading of non-active morphology were detected, but the level of errors is low for the PS-1 and minimal for the PS-2 group. Hence, it seems that only the younger children encounter a few problems with the ambiguity of the non-active voice.

Taken that the stimuli sentences are non-truncated forms, a discussion on children’s performance with reference to the ‘by-phrase’ is required. Both PS-1 and PS-2 in their attempt to comprehend non-active full forms take into consideration the ‘by-phrase’. If they did not, we would expect a big number of non-target answers since non-active truncated forms with [+\ animate syntactic subjects are ambiguous between the reflexive and the passive interpretation.

In particular, if in the stimulus-reflexive (target-passive) sentences the ‘monos tou’ phrase was ignored, then one would expect a good number of ‘yes’ (i.e. non-target) responses, since the non-active structure without the adjunct ‘monos tou’, which emphasizes reflexivity, is ambiguous between the reflexive and passive interpretation. Further evidence for the mastery of full passives comes from the production part of the test, where there is absolute use of the ‘by-phrase’ by the PS-2 group, who in all instances used non-active voice forms. The PS-1 group made above average use of the ‘apo’ phrase in the target active and passive readings, and almost 100% use of ‘monos tou’ in the reflexive reading. Hence a developmental trend in the use of full non-active structures is observed. The results are in line with Fox and Grodzinsky’s (1998) results, which support the availability of full actional passives in the speech of 3-year-old children.

What is more, the fact that the PS-1 children make average use of the ‘by-phrase’ cannot be a strong argument against the mastery of full passives; for one thing, as Warburton (1975), Maratsos et al (1985) and Tsimpli (2005a) indicate, the use of the ‘by-phrase’ in Greek is a marked choice.

The data constitute evidence against Borer & Wexler’s (1987, 1992) claim that children are not able to form full verbal passives until the age of 5. For one thing, highest scores for both groups were counted in the target-passive reading. Note that in the target-passive, the stimulus sentence is reflexive; hence, it is not possible to adopt an account which states that the passive is not available in 3-4 year old children. These findings are in line with Fox and Grodzinsky’s (1998) results, which support the availability of full actional passives in the speech of 3-year-old children.

Some problems with the ‘by-phrase’ though exist for the PS-1 group. Some children are unable to find the appropriate PP phrase in the production part of the test, despite the fact that they comprehend the stimulus sentence and correctly reject it as incorrect.

Turning to voice preference, the results show more frequent use of the active over the non-active voice by both age groups when the targeted meaning is active and passive, in spite of the fact that the stimulus sentences involve non-active forms\(^3\).

Preference for non-active voice is observed only when reflexivity is implied. This provides evidence for the mastery of voice alternations and goes against an input-driven hypothesis. In the test, the most economical procedure to produce a target-passive sentence when the stimulus was reflexive would be to substitute ‘monos tou’ with the ‘apo’ phrase and keep everything else the same. This is because as Pinker et al (1987) observe, it is easier to produce a sentence beginning with the argument which is

\(^3\) Note that Greek’s flexible word order does not necessitate voice change to achieve “topic-focus” effect.
emphasized in the input. Nevertheless, children of both ages preferred this more costly derivation.

As for the lower number of target scores observed in the answers of both groups in target active interpretation- as compared to the scores of the other two targeted interpretations- it may be possible that the processing load or some Piagetian kind of problems in defining the person who does and receives the action (Fox & Grodzinsky, 1998) are responsible, since the structure of target-active test sentences involved $2^{[+]}$ animate arguments. Nevertheless, we do not adopt the assertion that voice alternations are not mastered due to the high scores of appropriate voice shift (from non-active to active) in the production part. Adding to this, children of both groups make extensive use of active structures, which contain an accusative object clitic; the use of object clitics requires knowledge of the case system.

The clear preference of non-active voice only in the target-reflexive reading may indicate that voice preference relates to target reading only when the reading aimed at, can be expressed in a single structure. Reflexivity in its ‘unmarked’ form is linked with the non-active intransitive structure, despite that reflexives can be expressed in active transitive forms. When the interpretation or the stylistics targeted can be expressed in more than one structure, there is not such a connection.

The voice preferred also gives information about ‘markedness’ in the Greek language. Children’s preference for the active voice, agrees with the more extensive use of active voice in the Greek adult grammar. Warburton (1975, Tsimpli 2005a,b) attribute this preference to stylistic reasons and to some grammar-morphology restrictions in the derivation of non-active forms (Tsimpli, 2005a).

Turning to the interplay between the voice morphology, the “inherent” verb properties and the target meaning, no connection was found since there is no match between the semantic classification of verbs and the rates of target responses per reading. These findings are in support of the Syntactic Bootstrapping Hypothesis, as verb forms acquire meaning according to the structures in which they are found.

7. Conclusion
The experimental results of the study reveal that young children of 3-4 years old are aware of both the passive and reflexive interpretation which the non-active voice affix can receive and are able to produce full non-active structures and can shift between voices to express the same meaning. Therefore, Borer & Wexler’s (1987, 1992) suggestion for the mastery of A-chains is not supported in this study.

References


