

Contrastive Topics in Pairing Answers: A Cross-Linguistic Production Study¹

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1. A typological questionnaire on information structure

In this paper we present the results of a cross-linguistic production study bearing on the answers to single and double *wh*-questions, called ‘single answers’ and ‘pairing answers’ in the following. This study is part of a large experimental set-up designed to create a cross-linguistic spoken data archive for the study of the realization of information structure. For this purpose, a Questionnaire on Information Structure (QUIS, Skopeteas et al. 2006) has been developed, which contains the following modules for the creation of a data set in an object language:

- (a) The first module of QUIS is a classic grammatical questionnaire in the sense of Comrie and Smith (1977). It contains questions about the typological properties of the object language at all layers of grammar, with special emphasis on those properties that are relevant for the encoding of information structure (prosody, morphology and syntax).
- (b) The main part of QUIS aims at the elicitation of spontaneous spoken data in a near-naturalistic discourse context. This part of QUIS comprises 29 tasks which elicit sentences with different types of information structure. The individual tasks address a large number of information structural properties: different kinds of focus-background structure, discourse status of the referents (given, accessible, new),thetic vs. categorical sentences, contrast, selection, correction and several notions of topic (implicational topic, bridging topic, frame setting, etc.). In order to allow for cross-linguistic comparison, the elicitation tasks of QUIS rely on non-verbal stimuli, mainly pictures and videos, but also games and guided dialogues, which establish identical discourse situations in all object languages.
- (c) The third module is a set of 380 sentences to be translated and recorded while read aloud by a native speaker. These sentences are set in contexts and in this way induce a variety of information structural proper-

ties. This last module leans on a rich tradition of questionnaires illustrating target structures and contexts (see for instance the questionnaire on tense/aspect categories in Dahl 2000).

The cross-linguistic experiments in QUIS are designed to reveal several insights on the universals and typology of languages with respect to the encoding of information structure. In this paper, we present the results from one elicitation task, devoted to single answers and pairing answers. Section 2 outlines the research question concerning pairing answers and their properties in comparison to single answers. Section 3 introduces the related elicitation task in QUIS and explains the experimental procedure. Section 4 sums up the results with main emphasis on word order and sentential prosody, and section 5 discusses the results and draws some typological generalizations. Section 6 concludes the paper.

2. Pairing answers and single answers

‘Pairing answers’ are sentences that express the pairing between members of two given sets, i.e. they match members of one set to members of another set (see Dayal 2003). Assuming, for instance, a set of persons {John, Mary} and a set of fruits {apple, banana}, a pairing sentence matches members of these two sets, {(John, apple), (Mary, banana)}, as illustrated in (1a). In contrast to pairing sentences, ‘single sentences’ express the relation between two entities, as illustrated in (1b).

- (1) a. John is eating the apple and Mary is eating the banana.
b. John is eating the apple.

The crucial semantic difference between (1a) and (1b) is that the referents involved in the first example are members of a matching function that links each member of the first conjunct with the corresponding member in the second conjunct. The information structure of the examples in (1) depends on the context in which they occur, but following the above assumption, it is expected that they are inherently different across contexts: referents belonging to a pairing sentence bear an additional feature which captures the fact that they are members of a set.

An object question licenses the information structure illustrated in (2a-b). A single answer to a single object question has a discourse-linked sub-

ject constituent bearing a topic feature ‘Top’ (aboutness topic) and an object constituent that provides the information required by the question and bears the focus feature ‘Foc’. The pairing answer to a multiple object question in (2b) bears the same features plus a feature ‘C’ that indicates that the referents are members of a set of alternatives and are contrastive topics (see Féry and Samek-Lodovici 2006).

- (2) a. A: What is John eating?
 B: John_{Top} is eating the apple_{Foc}.
 b. A: What is John eating and what is Mary eating?
 B: John_{TopC} is eating the apple_{FocC} and Mary_{TopC} is eating the banana_{FocC}.

In the same vein, subject questions induce answers with the subject in focus in both cases. In the pairing answers, they bear a feature of contrast resulting from their property of being members of sets of alternatives. The object constituents express the information the sentence is about.

- (3) a. A: Who is eating the apple?
 B: John_{Foc} is eating the apple_{Top}.
 b. A: Who is eating the apple and who is eating the banana?
 B: John_{FocC} is eating the apple_{TopC} and Mary_{FocC} is eating the banana_{TopC}.

Pairing answers may also function as answers to multiple constituent questions. Following Roberts (1996) and Büring (2003), a multiple constituent question may be derived by a set of subquestions that take either the subject or the object as the sorting key. This predicts that both structures, illustrated as B and B’ in (4), are congruent answers to the multiple constituent question.²

- (4) A: Who is eating what?
 (subquestions: What is John eating?, What is Mary eating?)
 B: John_{TopC} is eating the apple_{FocC} and Mary_{TopC} is eating the banana_{FocC}.
 (subquestions: Who is eating the apple?, Who is eating the banana?)
 B’: John_{FocC} is eating the apple_{TopC} and Mary_{FocC} is eating the banana_{TopC}.

Even if both are congruent with respect to question A, these answers should not be seen as equally likely to occur. It has been argued that this type of question requires that one of the arguments is contextually given or at least subject to an ‘aboutness’ condition (see Boškovic 2002, Kuno 1982, Comorovski 1996, Krifka 2002, among others). Though the accounts crucially differ with respect to the conditions that determine which argument is discourse linked (either the subject as typical carrier of given information, or the first constituent in the question as a result of its hierarchical position in the sentence structure), it is expected that the strategy implied by the answer B will be preferred over that of B’.

On the basis of these reflections, two hypotheses can be formulated, which are tested below.

Hypothesis I:

Effects of topicalization are more likely to occur in the pairing answer than in the single answer.

Hypothesis II:

Multiple constituent questions induce answers in the form ‘subject topic – object focus’.

3. Elicitation task on pairing answers

The aim of the elicitation task, to which we now turn, is to establish a near-naturalistic discourse setting for the production of the answer types just described. The data give us (a) insights about individual languages’ reflexes for the encoding of the information structural properties in the different contexts, and (b) empirical support for theoretical assumptions.

3.1. Materials and Procedure

In the elicitation task eight question types (see section 3.2) are implemented by eight items corresponding to different situations presented in pictures, resulting in a total of 64 experimental elements. The experimental elements are distributed in 8 sessions following a factorial design, so that each session contains 8 elements from different conditions and different items. 16

native speakers of each language participated in the production study. In sum, the results are based on 16 sentences per condition. Each session contains a large number of different production tasks, such as an experiment on spatial relations, narrations about short films, etc. These tasks are pseudo-randomly distributed within the sessions.

Each item corresponds to a different event: “drinking”, “eating”, “holding”, “throwing”, “carrying”, “pushing”, “looking” and “hitting”. Two stimuli have been prepared for each event, one with parallel events and one with single events, as illustrated in Fig. 1.



Figure 1. Left picture: parallel events stimulus; Right picture: single event stimulus

The material was presented in a power point presentation, to be run in a self-paced manner. The questions had been pre-recorded by a native speaker of each language. The answers of the subjects were recorded on a DAT recorder (SONY 100), and analyzed with PRAAT (Boersma and Weenink 2006).

3.2. Conditions

Pairing and single sentences were elicited in four conditions:

- (5) All-new (wide focus)
 - a. single answer
What’s happening? (single event stimulus)
 - b. pairing answer
What’s happening? (parallel events stimulus)
- (6) Subject question (focus on the subject)
 - a. single answer

- Who is eating the apple? (parallel events stimulus)
 - b. pairing answer
Who is eating the apple and who is eating the banana?
(parallel events stimulus)
- (7) Object question (focus on the object)
 - a. single answer
What is the woman eating? (parallel events stimulus)
 - b. pairing answer
What is the woman eating and what is the man eating? (parallel events stimulus)
- (8) Multiple constituent question (double foci)
 - a. single answer
Who is eating what? (single event stimulus)
 - b. pairing answer
Who is eating what? (parallel events stimulus)

The stimuli with parallel events were used for the elicitation of the pairing answers as well as for the elicitation of single answers with single subject and object questions. The question evoking all-new answers and the multiple constituent question for the elicitation of single descriptions were presented with the single event stimulus.³

3.3. Object Languages

The elicitation task on pairing answers was carried out with four languages: English, Georgian, German, and Greek.⁴ These languages differ significantly with respect to their word order properties, especially the possibility to move the arguments from their canonical position to encode pragmatic functions. English is a rigid SVO language, though certain information structural manipulations can induce deviations from the canonical constituent order, notably preposing of one argument or inversion of the two arguments (Ward and Birner 2004). In Georgian, the orders SOV and SVO are the preferred orders in corpora, but it is a matter of dispute whether the verb final order is the canonical one (Aronson 1982: 47) or if both orders are canonical (Harris 1981; Hewitt 1995). Furthermore, in Georgian the order of S and O may be reversed under the influence of the information status of the referents. German declarative sentences exhibit SVO order (with SOV as the basic order; see Thiersch 1978) and arguments may be reordered to

encode pragmatic functions. The Greek preferred order is SVO and focusing and topicalization are expressed through movement to the left periphery as well as clitic doubling.

All four languages are intonation languages. The prosodic realization of the sentence is sensitive to information structure: pitch accents and boundary tones are determined by the pragmatic function of the constituent, such as topic or focus.

4. Results

4.1. Word order

In all four languages, the subject precedes the object in the canonical word order, as is particularly clear in the ‘all-new’ answers; see the single event examples from Georgian (9) and German (10) and the parallel events from English (11) and Greek (12). The order illustrated in (9)-(12) is the only attested order in all-new answers in English, German, and Greek. In Georgian, it is the dominant order with one exception (see Table 1).

(9) A: ‘What’s happening?’ (stimulus: single event)
 GEO⁵ B: k’ac-i tʃ’am-s banan-s
 man-NOM (OBJ.3)eat-SBJ.3 banana-DAT
 ‘A/the man eats a/the banana.’

(10) A: ‘What’s happening?’ (stimulus: single event)
 GER B: Ein Mädchen wirft einen Ball.
 ‘A girl is throwing a ball.’

(11) A: ‘What’s happening?’ (stimulus: parallel events)
 B: A man is eating a banana and a woman is eating an apple.

(12) A: ‘What’s happening?’ (stimulus: parallel events)
 GRK B: i jinéka trói éna mílo ci o ádras trói mja banána.
 the woman eats an apple and the man eats a banana
 ‘The woman is eating an apple and the man is eating a banana.’

The same order was produced in the object questions, both in the single and in the pairing answers. All sentences exhibit subject first orders as illustrated in (13) for German.

- (13) A: ‘What is the man hitting and what is the woman hitting?’
(stimulus: parallel events)
GER B: Der Mann schlägt einen Ball, das Mädchen einen Karton.
‘The man is hitting a ball, the girl a box.’

A subject question induces answers in which the subject is the focused information and the object is the background. The Greek data contains two examples of object fronting, and for Georgian more than half of the answers exhibited object fronting (14).

- (14) A: ‘Who is throwing the ball?’ (stimulus: single event)
GEO B: burt-s isvri-s gogo
ball-DAT (OBJ.3)throw-SBJ.3 girl(NOM)
‘A/the girl throws a/the ball.’

In agreement with Hypothesis I, multiple subject questions induce answers in OS order in Georgian (15), Greek (16), and German. In Greek, a familiar object is left-dislocated and triggers clitic doubling.

- (15) A: ‘Who is throwing the ball and who is throwing the ring?’
(stimulus: parallel events)
GEO B: burt-s isvri-s gogona
ball-DAT (OBJ.3)throw-SBJ.3 girl(NOM)
betʃed-s isvri-s bitʃuna
ring-DAT (OBJ.3)throw-SBJ.3 boy(NOM)
‘A/the girl throws a/the ball, a/the boy throws a/the ring.’
- (16) A: ‘Who is pushing the car and who is pushing the table?’ (stimulus: parallel events)
GRK B: to aftokínito to spróxni i jinéka ke to trapézi
the car it pushes the woman and the table
o ádras
the man
‘The woman is pushing the car and the man the table.’

Finally, multiple constituent questions induced answers in the SO order, as predicted by Hypothesis II.

- (17) A: ‘Who is throwing what?’ (stimulus: parallel events)
 GEO B: gogona isvri-s burt-s
 woman(NOM) (OBJ.3)throw-SBJ.3 ball-DAT
 bit]’una isvri-s rgol-s
 boy(NOM) (OBJ.3)throw-SBJ.3 circle-DAT
 ‘A/he woman throws a/the ball and a/the boy throws a/the circle.’

A single example in OS order as an answer to a multiple constituent question occurs in Georgian, in accordance with the word order flexibility of this language, which is apparent even in all-new contexts.

Table 1 summarizes the results on word order in non-elliptical answers. As a result, fewer sentences with argument focus are counted in single answers than in pairing answers, since the former type of question often triggers argument ellipsis.

Table 1. Number of SO/OS clauses

	focus	English		German		Greek		Georgian	
		SO	OS	SO	OS	SO	OS	SO	OS
single answer	all	15	–	14	–	16	–	15	1
	O	10	–	10	–	3	–	14	–
	S	13	–	12	–	14	2	7	7
	SO	14	–	14	–	16	–	12	–
pairing answer	all	11	–	15	–	16	–	14	1
	O	15	–	15	–	15	1	14	–
	S	15	–	14	2	11	5	6	10
	SO	15	–	16	–	16	–	13	1

The few sentences in Table 1 do not allow for statistic inferences, but they reveal some typological differences that are in line with the grammatical profile of the object languages (see section 3.3). The data shows that the subject question induces different word orders to a greater extent than the other questions. It has a stronger impact in Georgian and Greek, a weaker impact in German – more so in pairing answers than in single answers – and no impact in English (see discussion in section 5).

4.2. Prosodic properties

4.2.1. Prosodic structures

The four languages investigated use intonation to signal information structure. English, German and Greek have been described extensively in the literature (see, among others, Pierrehumbert 1980, Ladd 1996, Gussenhoven 2004 for English, Uhmman 1991, Féry 1993, Grabe 1998 for German, and Arvaniti & Baltazani 2005 for Greek), but, up to now, there is no study dealing with the intonation of Georgian (see Skopeteas, Féry, and Asatiani 2006 for a first attempt). In all four languages, a focused constituent is realized prosodically with a pitch accent, and a constituent in the background may be deaccented, depending on its position relative to the last focused constituent.

Prenuclearly, these languages realize accents on given constituents. This is illustrated with an object question in Greek (Fig. 2). A rising contour occurs in the prenuclear accented word.⁶ The focused constituent (*éna trapézi*) is marked with a falling accent (noted H*L). The high part of the falling accent is downstepped relative to the high part of the first accent.

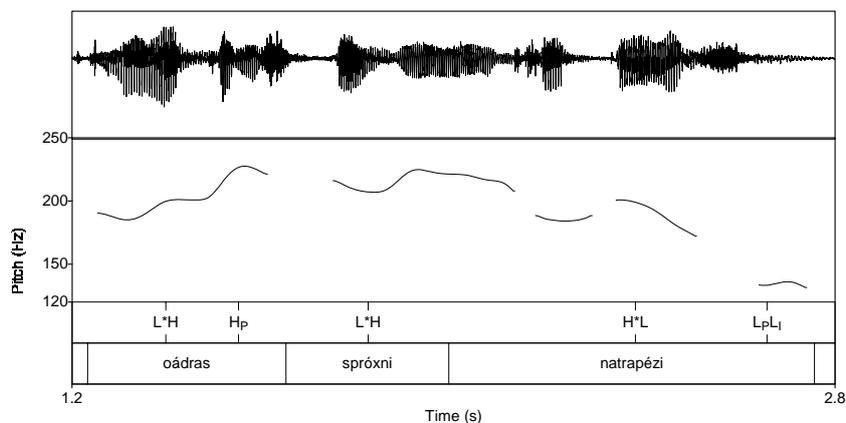


Figure 2. Greek sentence [l [P o ádras]_{Top} [P spróxni na trapézi_{Foc}]] ‘The man is pushing a table’ as an answer to the question ‘What is the man pushing?’

It is conspicuous that there is no noticeable difference between a sentence with a unique focus on the object, as in Fig. 2, and a sentence realized as an

answer to a multiple constituent question (single event), as in Fig. 3. In both cases, a rising tone is located on the subject and a falling tone on the object. Downstep is also visible in Fig. 3.

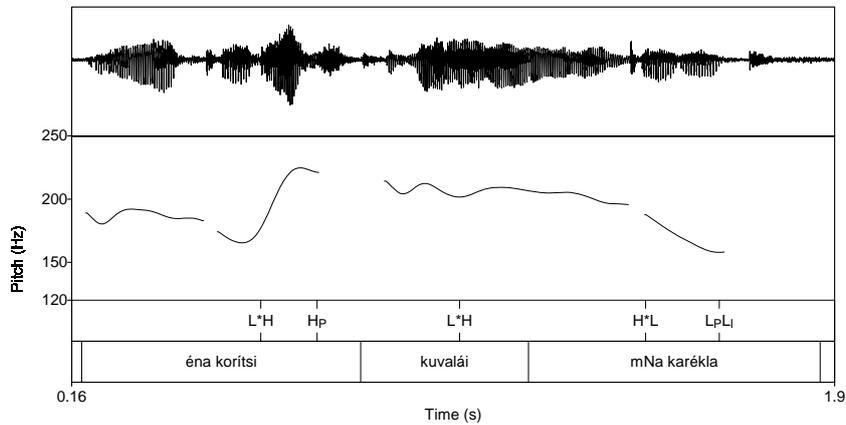


Figure 3. Greek sentence [_I [_P *éna korítsi*]_{Top} [_P *kuvalái mNa karékla*]_{Foc}] ‘A girl is carrying a chair’ as an answer to the question ‘Who is carrying what?’

In the postnuclear position, a given constituent is deaccented, as shown in Fig. 4, again for Greek. In this sentence, the subject bears the falling accent H*L, as it is the last accent of the sentence. The object is clearly deaccented. English and German show the same intonational behavior. Georgian also deaccents its postnuclear constituents, though less regularly than in the other three languages.

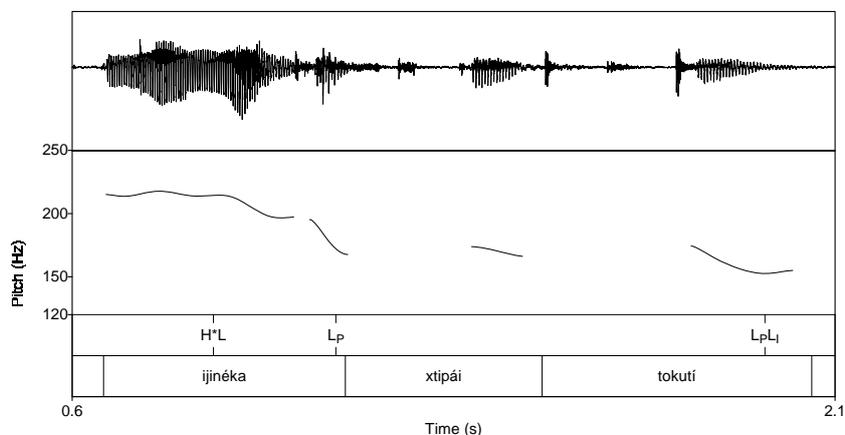


Figure 4. Greek sentence [_I [_P *i jinéka*_{Foc}] [_P *xtpái to kutí*_{Top}]] ‘The woman is hitting the box’ as an answer to the question ‘Who is hitting the box?’

Answers to multiple questions are illustrated in Figures 5 and 6. It is tempting to analyze these sentences as consisting of two intonation phrases (IP) together forming a complex intonation phrase (see Féry and Truckenbrodt 2005 for IP recursivity in German). Both subjects have a rising contour and the object NP in the second conjunct has a falling accent H*L. But in the first conjunct, the accent signaling focus is overridden by the rising boundary tone. The main characteristic of these sentences in German and in English is the typical downstep pattern, signaling cohesion between the two IPs. The subjects are downstepped relative to each other, as are the objects. It must be noted that the rising tone has been analyzed as a topic accent in German, Greek and English, but that, in our sentences, due to the preference for having a rising accent at the beginning of the phrase and a falling one at the end of the sentence, the focus accent is sometimes realized as a rising tone, and the accent on a given constituent may have a falling tone. The typical pattern found for the pairing answers is illustrated for German and English with multiple question responses. However, due to the contrastive reading that these sentences have, the same contour was also realized when only the subject or only the object was asked for (see section 4.2.2).

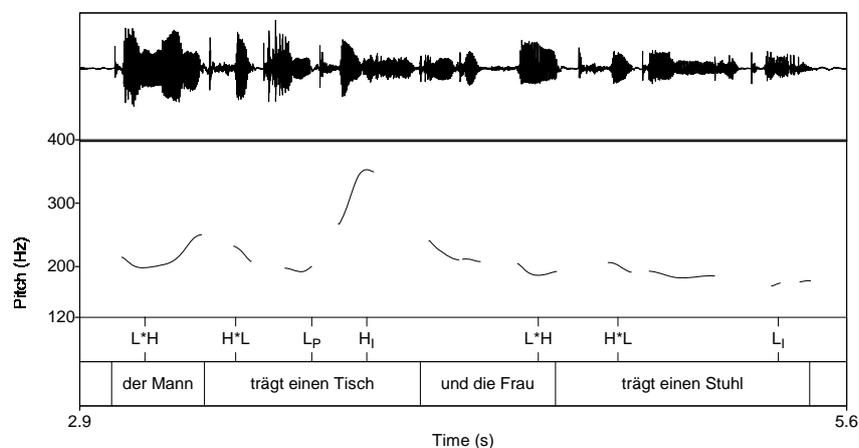


Figure 5. German sentence [I [P *Der Mann*]_{TopC} [P *trägt einen Tisch*_{FocC}]] [I [P *und die Frau*]_{TopC} [P *trägt einen Stuhl*_{FocC}]] ‘the man is carrying a table and the woman is carrying a chair’ as an answer to the question ‘who is carrying what?’

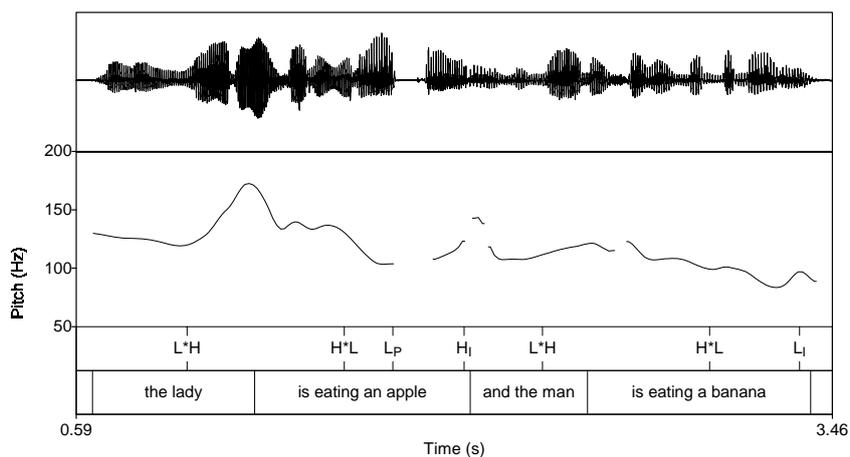
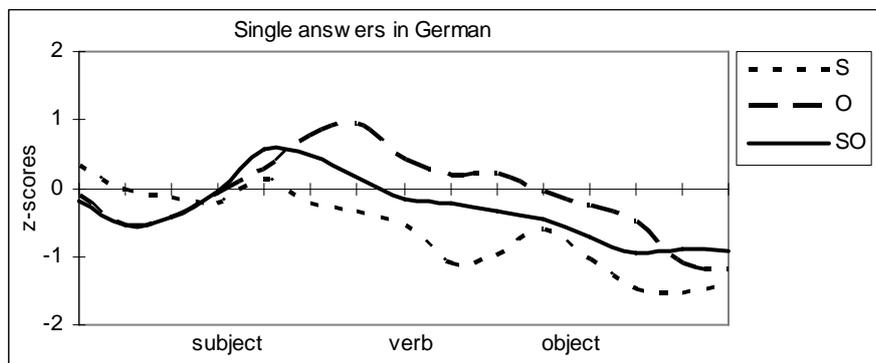
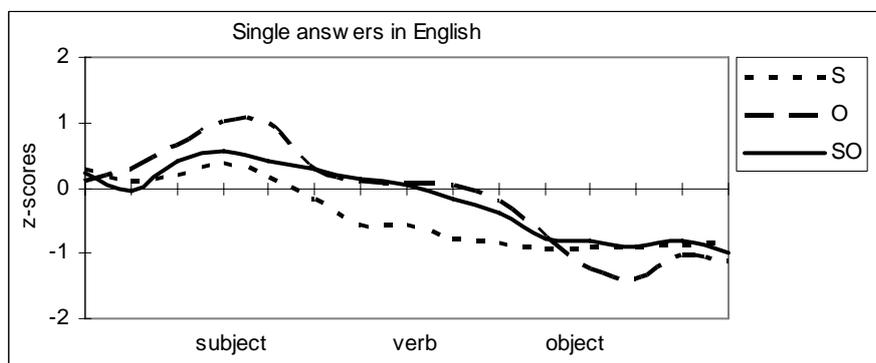
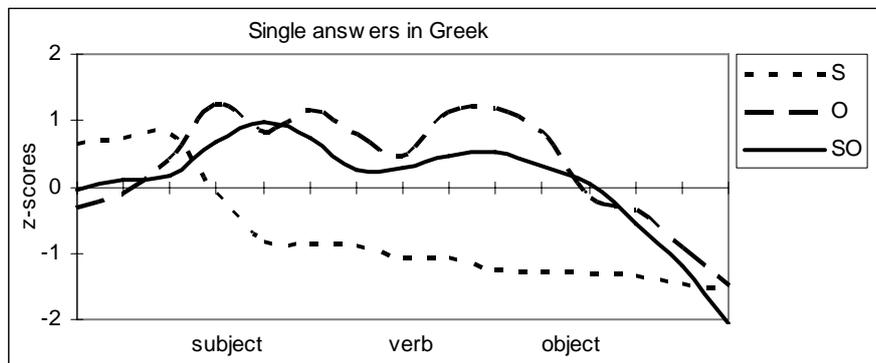


Figure 6. English sentence [I [P *The lady*]_{TopC} [P *is eating an apple*_{FocC}]] [I [P *and the man*]_{TopC} [P *is eating a banana*_{FocC}]] as an answer to the question ‘Who is eating what?’

Because of the neutralization of tonal patterns due to the extensive use of hat patterns in different contexts, the differences between the prosodic results need to be quantified. We turn to this task in the next section.

4.2.2. *Cross-linguistic tendencies*

The question arises as to the quantity of pitch accents and deaccenting realized in the different conditions. In this section, normalized tonal contours⁷ for the SVO sentences in the four languages are compared. The quantified data allow the visualization of differences that cannot be perceived by a comparison involving single pitch tracks. First, the results for single answers are displayed in Fig. 7 for subject focus (S), object focus (O) and double question focus (SO). The discussion concentrates on pitch accents and deaccenting. The contours obtained in the double foci conditions are interpreted as the baseline. They show in all languages more than one accent: in English, German and Greek only the subjects and the objects are accented, while in Georgian the verb is accented as well. In Greek and German, the verb and the object are lower when the subject is a narrow focus than in the other conditions. In English, only the verb is lower, and the deaccenting of the object is signaled by the absence of further tonal movement. In Georgian, the subject is higher than in the other conditions, but object and verb are more or less identical in all three conditions. In German and in Greek, the contour starts higher when the subject is narrowly focused, and in Greek the fall on the subject is aligned earlier. In Georgian, the narrowly focused subject has a rising contour and it is this rise which aligns differently: it is much later than in the other contours. As for narrow focus on the object, in Greek, German and Georgian, the object is higher than in the other conditions, but this is not true for English. In English, accenting of the object is signaled by a further downstepping accent. Greek is the only language in which a narrow focus on the object is significantly higher than in the double focus condition. Furthermore, in this language, an additional accent appears on the verb.



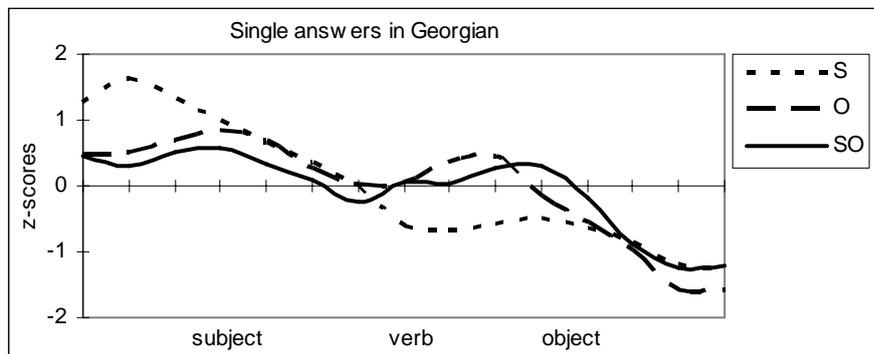
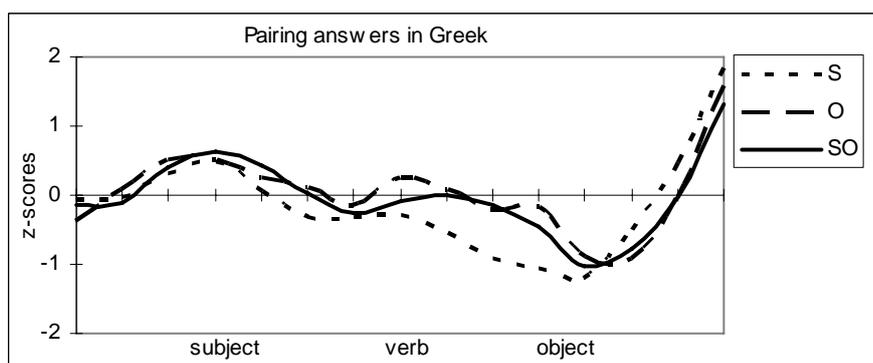


Figure 7. Time and F_0 normalized contours of the SVO single answers

Fig. 8 shows normalized contours for the first conjunct of the pairing answers. Here, the question type does not have a large impact on the question. All three question types induce answers with a similar contour, in conformity with the double contrast induced by a double conjunct: a rise followed by a fall on the subject, a smooth fall on the verb (except in Greek where the verb is accented as well), and the final rise. The most conspicuous property of these pitch tracks is the steep rise induced by the boundary at the end of the contour, in Greek and German more so than in English and in Georgian, due to the fact that in these latter languages, a large proportion of the sentences were accompanied by a falling contour. Only Greek shows a difference between narrow focus on the subject and the other contours. And only German shows a difference with narrow focus on the object. In this case, the object has a lower contour.



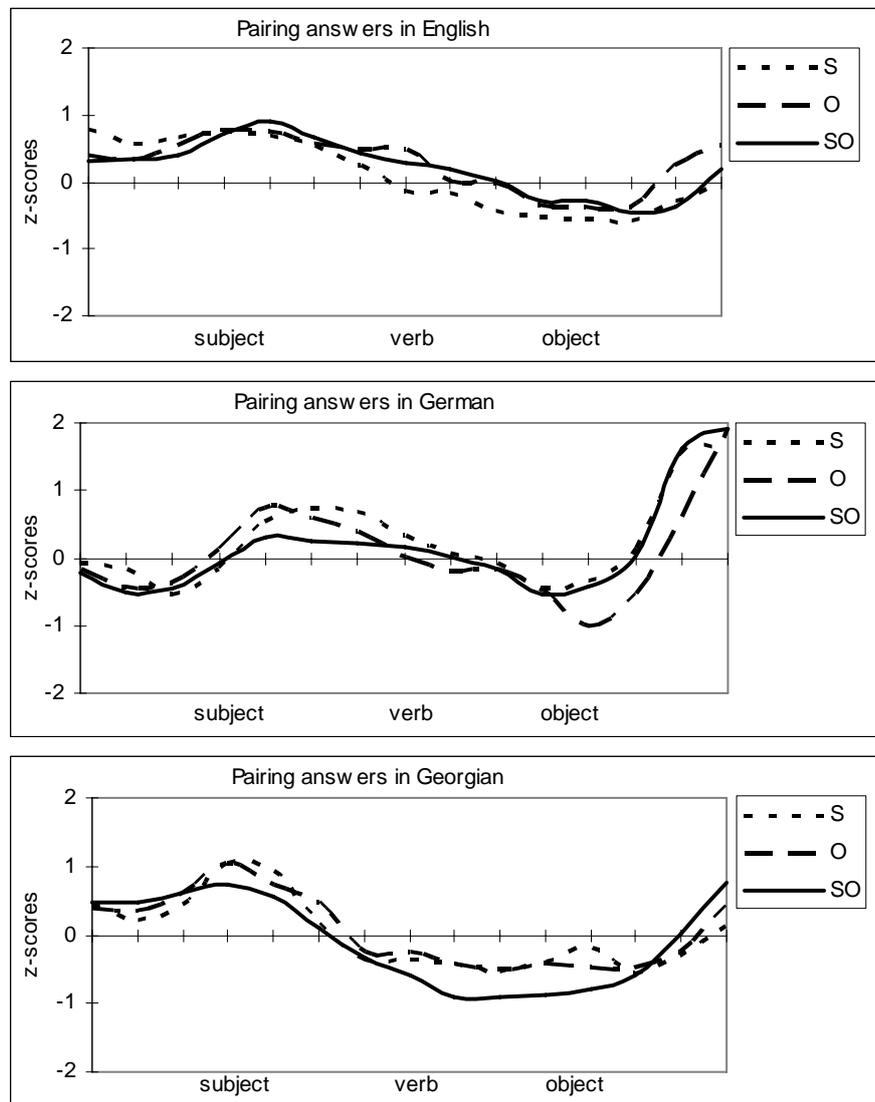


Figure 8. Time and F_0 normalized contours of the SVO pairing answers

In sum, single list answers reveal differences in prosodic strategies in all four languages, but in the pairing answers, these differences are neutralized. It can be deduced that the need to realize the double contrast (on the subject and on the object) overrides the difference in the focus-background struc-

ture. An accent is always realized on both subjects and both objects, leading to a homogeneous accent pattern in all cases.

5. Discussion

In section 2, we presented the two central hypotheses of this elicitation task, which are repeated here.

Hypothesis I:

Effects of topicalization are more likely to occur in the pairing answer than in the single answer.

Hypothesis II:

Multiple constituent questions induce answers in the form ‘subject topic – object focus’.

We found evidence for Hypothesis I in the results from both word order and prosody. With respect to word order, we distinguish between three language types. In English no deviation from canonical order could be observed. In Georgian, the given-before-new order is the preferred option, and this triggers object fronting in both experimental conditions in which the object is part of the background. Finally, in Greek and German discourse conditions have different effects on word order. In German, familiarity of the object does not induce object fronting, but contrastive topicalization does. In Greek, we observe the same pattern with a slight quantitative difference. Familiar object constituents are rarely fronted, but when the familiar object is also contrasted in a pairing answer, then object fronting occurs much more frequently. As far as prosody is concerned, the pairing answers were nearly always produced with a prosodic pattern in which both subject and object are accented. This prosodic pattern is congruent with a pattern in which the subject is topicalized.

The second hypothesis relates to the different types of questions, and to the types of answers they elicit. The answers to multiple constituent questions are expected to induce a topic – focus pattern more often than the other questions. The results from word order have shown that these questions do not induce object fronting. This evidence is in line with the view that the sorting key in multiple constituent questions in which the subject pronoun precedes the object pronoun is the subject. However, this is not a

necessary implication of our results, since the SO order is – at the same time – the canonical order of all examined languages.

The results from the prosody of SVO sentences reveal that in the single answers, the focus structure is directly implemented in the pitch excursions. Object questions trigger answers with a falling accent on the sentence final (object) constituent, and subject questions trigger answers with a falling accent on the sentence initial (subject) constituent. The prosody of double foci is similar to that of narrow focus on the object, with the exception that the excursion on the object is not as high as in the narrow focus condition. Turning to the prosody of answers to multiple object and subject questions, the focus is overridden by a prosodic structure imposed by the contrastive context and according to which the sentence initial constituent is accentually marked as a topic. Multiple constituent questions induce subject topic – object focus answers, which confirms Hypothesis II.

The predicted relationship between prosody and syntax is borne out. Syntax follows prosody in the sense that if a certain kind of prosody is strongly preferred (topic – focus accent pattern in a large number of the conditions), the syntax seeks to adapt. Since the prosodic marking of the initial constituent as a focus is clearly dispreferred in pairing answers, object fronting – in languages that allow for it – is the only remaining possibility to topicalize objects in this structure.

6. Conclusion

This paper has presented results from an elicitation task in the framework of a questionnaire on information structure (QUIS). The task consisted in answering questions with the help of single answers or pairing answers in a well-balanced design. Four languages have been used for this paper: English, Georgian, German and Greek. It has been shown with word order and prosody that this specific task is appropriate to identify specific differences between the strategies used in the implementation of focus structures. Word order is subject to more variation in Georgian and Greek than in German and English. The comparison between strategies involving prosody shows that single answers are more prone to display differences than pairing answers. The reason for this discrepancy is that pairing answers also involve a contrast, which overrides other information structural properties that these sentences may have.

The investigation started in this paper needs to be extended in three ways. First, non-intonation languages, like tone languages and pitch accent languages, use different prosodic strategies, based on phrasing rather than on pitch excursion contrasts. This needs further material and thorough investigation. Second, the unique task reported on here can only reveal a tiny proportion of the interesting strategies used by languages in the reflexes of information structure. A large number of such tests are needed to provide us with a complete overview and to allow the formulation of sound typological generalizations. Third, variation in the production of spoken material also needs careful investigation.

Research in these directions has already been conducted, and we will provide results from all three lines of investigation in the near future.

Notes

1. This paper is part of project D2 “Typology of information structure” of the SFB 632 on information structure. We would like to thank Stefanie Dipper, Gisbert Fanselow, Michael Goetze, and Ruben Stoel for helpful discussions, as well as Anja Arnhold, Katharina Moczko, Andreas Pankau and Fabian Schubö for technical assistance.
2. It is assumed here that a constituent cannot be both a topic and a focus at the same time, and that the constituent chosen as the sorting key is necessarily a topic (see Büring 2003). We are aware that this assumption is speculative.
3. The use of a multiple constituent question is marked in several languages, among them English and German, if it refers to a single pair. Nevertheless, this question has been included in our elicitation task in order to maintain the symmetry of the experimental design. All informants answered this question felicitously.
4. The English data were collected and transcribed by Elisabeth Medvedovsky, the Georgian data by Shorena Bartaia, the German data by Andreas Pankau and Katharina Moczko, and the Greek data by Thanasis Georgakopoulos, Yanis Kostopoulos, and George Markopoulos.
5. Abbreviations for language names: GEO=Georgian, GRK=Greek, GER=German; Abbreviations for glosses: 3=3rd person, DAT=dative, NOM=nominative, OBJ=object, PRV=preverb, SBJ=subject.
6. We do not consider prosodic phrasing in this paper, due to lack of space, and follow suggestions by Revithiadou and Spyropoulos (2006). According to them, the NP-subject *o ádras* ‘the man’ forms a p-phrase and is delimited on the right by a phrase tone H_p.

7. The figures in this section present the means of normalized contours of the SO sentences in Table 1. The time axis contains the measurements of F_0 means of five equal intervals for each constituent. The pitch measurements have been normalized by transformation into z-scores (the difference between the pitch measurement and the speaker's means has been divided by the standard deviation of the same speaker).

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