Structured Questions

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1. Introduction

Discourse is said to be structured by hierarchically related Questions Under Discussion (QUDs) (Roberts, 2012, a.m.o.). I claim utterances themselves can contain QUD structure. In this paper, I discuss novel data in Turkish, that I call *structured questions*. While questions are traditionally thought to be associated with a single QUD, structured questions raise two hierarchically related QUDs.

(1) Su mu istiyor-sun, **yoksa** kahve mi, çay mı?
water MI want-2sg YOKSA coffee MI tea MI
Do you want water, or else coffee, or tea? Possible answers: *water, coffee, tea*

Turkish structured questions, like (1), are syntactically characterized by the position of the particle *yoksa* before at least two alternatives; semantically, by a sense that alternatives are separated by *yoksa* into two groups. To explain this grouping effect, I propose an analysis for *yoksa* as raising a QUD of its own, in addition to the one raised by the semantics of the question. For example, (1) raises the following two QUDs (represented as sets of alternatives (Hamblin, 1973)): QUD_0 = {*water*, *coffee*, *tea*}, from traditional semantics for alternative questions (Karttunen, 1977); and QUD_1 = {*water*, *caffeinated drink* (or any relevant grouping of *coffee* and *tea*)}, from the semantics of *yoksa*.

A similar phenomenon is discussed by Wagner (2010), who looks at grouping effects in coordinations that arise from the effect of prosodic boundaries. I argue that the grouping effects of prosodic boundaries and those of *yoksa* are slightly different, and must be analyzed differently. I suggest that the former arises from a pragmatic inference that the coordination is non-associative, while the latter arises from the semantics of *yoksa*, that requires its prejacent to answer a QUD.

2. Background: prosodic grouping in coordination structures

Wagner (2010) observes grouping effects in English coordinations as a result of strong prosodic boundaries separating the groups, as in example (2):

(2) Mary || and Sarah and Annie arrived. (|| = strong prosodic boundary)

(3) Mary and Sarah and Annie arrived.

Consider a context in which M and S arrived together, separately from A; and one in which S and A arrived together, separately from M. (3) is felicitous in both contexts; (2) is only felicitous in the first.

The effect of prosodic boundaries can also have a truth-conditional effect:

(4) Abe || and Bill or Seth arrived.

(5) Abe and Bill || or Seth arrived.

Prosody appears to mark constituency: (4) corresponds to *A and (B or S)*; (5) to *(A and B) or S*.

Wagner (2010) interprets and generalizes data such as (2)–(5) as follows:

(6) a. In an associative coordination, elements are separated by boundaries of equal strength.
b. In a non-associative coordination, constituents that are more deeply embedded are separated from each other by weaker boundaries than constituents that are less deeply embedded.

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The string in (4)/(5) is non-associative: in order to interpret it, constituent boundaries must be prosodically marked. The string in (2)/(3) is associative: it is felicitous with boundaries of equal strength. However, if one does mark a prosodic boundary, as in (2), an inference that the coordination is non-associative arises. This is possible if the *and*s are different: e.g. in (2), the first *and* could correspond to a Boolean conjunction, and the second *and* to a mereological sum operator (Link, 1983).

Wagner (2010) argues that coordinated elements separated by boundaries of equal prosodic strength are constructed within one phase (Chomsky, 1999), and are by default left-branching. In contrast, coordinated elements separated by boundaries of different strength are constructed phase by phase, where weaker boundaries correspond to deeper embedding, as in the schematic example in (7).

(7) Structure of "A || B | C ||| D" : [[A [B C]] D] (more '|' = stronger boundary)

Constituency affects the order of operations, explaining the effects observed in (2)–(5).

In this paper, I adopt Wagner (2010)'s account of relative boundary strength in coordinations as correlating semantically with non-/associativity, and syntactically with constituency, as described above.

3. Turkish structured questions: *yoksa* versus prosody

In this section I look at grouping effects in Turkish alternative questions arising from a non-standard position of the particle *yoksa*, and those arising from relative strength of prosodic breaks. I show that they differ in that *yoksa* only groups alternatives coming after it, while prosodic groupings require to be isomorphic to semantic groupings. Similarly to Wagner's (2010) examples, prosodic boundaries[1] between alternatives in AQs induce grouping effects, as shown in examples (8) and (9).

(8) Şarap mı istiyorsun, bira mı, || rakı mı?
wine MI want.2sg beer MI rakı MI
Do you want wine, or beer, || or rakı? Possible answers: *wine, beer, rakı*
(the question asks if the addressee wants soft alcohol or hard liquor, with the options specified)

(9) Context: *I have a good bottle of wine out on the table that I want to offer my friends. However, I don't want to force them to have wine and tell them the other options I have.*

Şarap mı istiyorsun, || bira mı, rakı mı, ...?
wine MI want.2sg beer MI rakı MI
Do you want wine, || or beer, or rakı...? Possible answers: *wine, beer, rakı...*

In (8), alternatives are grouped in terms of alcohol type; in (9), they are grouped in terms of contextual prominence (what is out on the table and I want my friends to taste, versus the rest).

In standard Turkish AQs, there are prosodic boundaries of equal strength between each alternative. Moreover, *yoksa* commonly appears before the last alternative ("pre-finally"), not affecting interpretation.

(10) Şarap mı istiyorsun, bira mı, (**yoksa**) vodka mı?
wine MI want.2sg beer MI YOKSA vodka MI
Do you want wine, beer or rakı? Possible answers: *wine, beer, rakı*

When *yoksa*[2] appears before at least two alternatives ("non-pre-finally"), grouping effects are formed.

(11) Context: Same as in (9).

Şarap mı istiyorsun, **yoksa** bira mı, rakı mı, ...?
wine MI want.2sg YOKSA beer MI rakı MI
Do you want wine, or else beer, or rakı...? Possible answers:[3] *wine, beer, rakı...*

[1]Prosodic boundary strength is encoded by various cues, such as pre-boundary lengthening, initial strengthening, pause, and presence of boundary tones (cf. Ladd, 2008). I base my observations primarily on the length of the pause.

[2]I translate *yoksa* by *or else*, that sounds less natural, but conveys a similar meaning in structured questions.

[3]For all AQs, flat or structured, there seems to be an exclusivity inference, i.e. only one of the alternatives can be the answer to the question (this inference is a well-known fact about AQs).

(11) has a similar grouping to (9): *yoksa* and the prosodic boundary in this position have a similar effect. However, this similarity is not recovered in pre-final position: (8) has grouping effects induced by pre-final boundary, (10) has no grouping effect with pre-final *yoksa*.

Non-pre-final *yoksa* generally produces a grouping effect, in fact, oddness arises when there is no contextually relevant grouping of post-*yoksa* alternatives, as observed in the contrast between (12a) and (12b).

(12) Context: *You are at a food stand, thirsty and hungry, but only have a couple of coins. The vendor helps you out, listing the items you can buy with what you have.*

a. Çay mı istiyorsun, kahve mi, **yoksa** elma mı, armut mu?
tea MI want.2sg, coffee MI, YOKSA apple MI, pear MI
≈ *Do you want tea, or coffee, or else an apple, or a pear?*
"Do you want something to drink, from the options water and orange juice, or a fruit to eat, from the options apple and pear?" (only one option available, given your money)

b. #Çay mı istiyorsun, portakal mı, **yoksa** elma mı, armut mu?
tea MI want.2sg orange MI, YOKSA apple MI, pear MI
Do you want tea, or an orange, or else an apple or a pear?

Apple and pear form a fruit group in (12a), but not in (12b), since orange is also an option. Note apple and pear could form another relevant grouping (e.g. prominence-based, like in (9)), and make (12b) felicitous.

Furthermore, groupings arising from *yoksa* are asymmetrical: post-*yoksa* options must be grouped, while pre-*yoksa* options don't have to be.

(13) Context: *Breakfast items are served on a table, there are three plates: one of simits (Turkish bagels), one of eggs, and one of fruit, of two types – apples and pears. Only one item is included in the price; the server tells you the options.*

a. Simit mi istiyorsun, yumurta mı, **yoksa** elma mı, armut mu?
simit MI want.2sg egg MI YOKSA apple MI pear MI
Do you want a simit, or an egg, or an apple or a pear?

b. #Elma mı istiyorsun, armut mu, **yoksa** simit mi, yumurta mı?
apple MI want.2sg pear MI YOKSA simit MI egg MI
int. Do you want an apple or a pear, or simit or an egg?

This asymmetry is not replicated with prosody: a strong prosodic boundary that replaces *yoksa* in both (13a) and (13b) is infelicitous. However, we can add a strong boundary in (13a) to have three prosodic groupings corresponding to the semantic groups, as in (14), making the utterance felicitous.

(14) Simit mi istiyorsun, #(‖) yumurta mı, ‖ elma mı, | armut mu?
simit MI want.2sg egg MI apple MI pear MI
Do you want a simit, or an egg, or an apple or a pear?

Yoksa can appear several times. In such cases, the interpretation depends on prosody. If the boundaries between each alternative are equal, no grouping effect arises:

(15) Şarap mı istiyorsun, **yoksa** bira mı, **yoksa** rakı mı?
wine MI want.2sg YOKSA beer MI YOKSA rakı MI
Do you want wine, beer or rakı? (same as (10))

On the other hand, a strong prosodic boundary before or after the first *yoksa* induces a grouping effect:

(16) Şarap mı istiyorsun, (‖) **yoksa** (‖) bira mı, **yoksa** rakı mı?
wine MI want.2sg YOKSA beer MI YOKSA rakı MI
Do you want wine, if not would you like beer or rakı? (same as (11))

Finally, strong prosodic boundaries counteract grouping effects created by *yoksa*. The question in (17) is (11) with a strong boundary before the last alternative – there is no longer a grouping effect.

(17) Şarap mı istiyorsun, **yoksa** bira mı, ‖ rakı mı?
wine MI want.2sg YOKSA beer MI rakı MI
Do you want wine, beer or rakı?

In summary, data shows that groupings formed by *yoksa* and prosody are similar in some cases but not all. I have replicated Wagner's (2010) observations in a new language and coordination type, where prosodic groupings must be isomorphic to semantic groupings. On the other hand, *yoksa* only requires alternatives that follow it to be grouped together, allowing a pre-final *yoksa* to produce no grouping effect. Moreover, when strong prosodic boundaries and *yoksa* interact, they are not on equal standing.

4. Proposal

In this section, I propose an analysis for the effects described above. I first lay out my assumptions, then propose a semantics for *yoksa*, and finally give derivations that account for the data of interest.

4.1. Preliminary assumptions

Alternative semantics. I assume alternative semantics (Hamblin, 1973; Karttunen, 1977). Following Beck and Kim (2006), I assume a Q operator (present in C for all questions) to lift the focus semantic value of its complement into an ordinary semantic value: $[\![Q\ \mathrm{TP}]\!]^o = [\![\mathrm{TP}]\!]^f$.

Clausal coordination. I follow Gračanin-Yüksek (2014) in treating alternatives in Turkish AQs as coordinating TPs, and allowing ellipsis (the chosen placement of the verb in the first coordinate in all the examples above makes this syntax relatively uncontroversial, assuming the law of coordination of likes).

The question particle MI**.** The focus semantic value of a MI...MI coordination is the set of ordinary semantic values of the members of the coordination. Its ordinary semantic value is undefined.

(18) $[\![A_1\ \textsc{mi},\ ...,\ A_n\ \textsc{mi}]\!]^f = \{A_1, ..., A_n\}$; $[\![A_1\ \textsc{mi},\ ...,\ A_n\ \textsc{mi}]\!]^o$ undefined (for $n > 1$)

Question relevance. (Roberts, 2012; Büring, 2003)

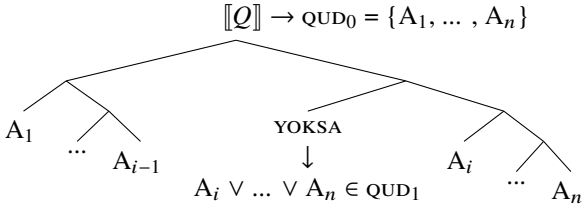
(19) A question q must be **relevant**, i.e. directly address a QUD$_0$: $[\![q]\!] \subseteq [\![\textsc{qud}_0]\!]$

A pragmatic principle.

(20) **Minimize QUDs**: Don't raise more QUDs than required by the semantics of the utterance.

4.2. Yoksa: marking a possible answer to a QUD

I propose that the particle *yoksa* does two things: semantically, it states that its prejacent is an answer to the QUD: phono-syntactically, it groups constituents on either side via prosody as described by Wagner (2010). The following diagram of an AQ summarizes these two effects.



4.2.1. The semantics of yoksa

I assume the at-issue semantics of *yoksa* to be trivial. Skipping a compositional account for reasons of space, the at-issue effect of adding *yoksa* to a MI...MI disjunction is null:[4]

(21) $[\![A_1 \text{ MI}, \ldots A_i \text{ MI}, \textit{ yoksa } A_{i+1} \text{ MI}, \ldots A_n \text{ MI}]\!]^f = \{A_1, \ldots, A_n\}$ (for $n > 1$)

The presuppositional content of *yoksa* is the one that is of interest:

(22) $[\![\text{yoksa } p]\!]$ presupposes that there is a QUD_1 such that $[\![p]\!]^o \in [\![\text{QUD}_1]\!]$

4.2.2. The prosodic effect of yoksa

In Turkish AQs, there is a prosodic boundary between each alternative. I assume that *yoksa* is always preceded by a prosodic boundary that is stronger than that of the default prosodic boundaries between alternatives, but weaker than a marked prosodic boundary.[5] Using Wagner's (2010) algorithm, we can derive the constituency of AQs based on the position of the particle *yoksa* and prosodic boundaries (as in example (7)). Results for AQs with three alternatives are summarized in Table 1.

	string	constituency	
(i)	a b c	[a [bc]]	boundaries of equal strength
(ii)	a Yb Yc	[a [[Yb] [Yc]]]	→ default left-branching structure
(iii)	a b Yc	[[ab] Yc]	boundaries of different strength
(vii)	a Yb c	[a [Y [bc]]]	→ structure directed by relative boundary strength
(iv)	a b ‖ c	[[ab] c]	
(viii)	a ‖ b c	[a [bc]]	
(v)	a Yb ‖ c	[[a [Yb]] c]	
(vi)	a Yb ‖ Yc	[[a [Yb]] Yc]	
(ix)	a ‖ b Yc	[a [b [Yc]]]	
(x)	a ‖ Yb Yc	[a [Y [b [Yc]]]]	
(xi)	a Y ‖ b Yc	[a [Y [b [Yc]]]]	

Table 1: *The constituency of AQs with three alternatives*
(where a, b, c = alternatives of the form "x MI"; Y = yoksa; ‖ = prosodic boundary)

4.3. Derivations

We begin with regular, "flat" AQs. A possible flat AQ is one in which there is no *yoksa*, like in example (10). Based on Table 1, such questions have a right-branching coordination structure.

(23) $[\![Q[A \text{ MI } [B \text{ MI } C \text{ MI}]]]\!]^o = \{A, B, C\}$

This question raises $\text{QUD}_0 = \{A, B, C\}$ (from the principle of question relevance), and no other QUD.

Another way to express a flat AQ is with the particle *yoksa* right before the last alternative (see example (10)). This structure is left-branching, as show in (iii) in table 1.

(24) $[\![Q[[A \text{ MI } B \text{ MI}] \textit{ yoksa } C \text{ MI}]]\!] = \{A, B, C\}$

The at-issue meaning is the same as in (23), therefore the question raises the same $\text{QUD}_0 = \{A, B, C\}$. $[\![\textit{yoksa}]\!]$ requires that C answers a QUD_1. Since $C \in [\![\text{QUD}_0]\!]$, we have $\text{QUD}_0 = \text{QUD}_1$ by the *Minimize QUDs* principle. The resulting meaning is therefore the same as in (23), as desired.

[4] *Yoksa* can also be treated as a disjunction, derived from *-sa* ("if") and *yok* ("not"). In AQs, *yoksa* is redundant, hence its optionality. This contrasts with English *or*, that is neither redundant nor optional.

[5] A flat AQ is associative, with or without *yoksa*. This leads us to reformulate the associativity generalization in (6), by replacing "equal" with "default", and assuming the boundary before *yoksa* in standard AQs is default.

Finally, a flat AQ can also be achieved with *yoksa* before each alternative with the constituency structure in (ii), as in example (15). Each *yoksa* requires that its prejacent be a possible answer to QUD_1; these match QUD_0, therefore yielding the same meaning.

A three-alternative structured question, with groupings, is one in which *yoksa* has a prejacent consisting of more than one alternative, as in (11). The constituency structure is as in (vii).

(25) $[\![Q[A \text{ MI } \textit{yoksa} \text{ } [B \text{ MI}, C \text{ MI}]]]\!] = \{A, B, C\}$

$[\![\textit{yoksa}]\!]$ requires that $[\![B \text{ MI}, C \text{ MI}]\!]^o = B \vee C$ be an answer to QUD_1. The question raises $\text{QUD}_0 = \{A, B, C\}$. $B \vee C$ does not fully answer QUD_0, therefore $\text{QUD}_1 \neq \text{QUD}_0$, in which QUD_1 is a sub-QUD to QUD_0 (based on the assumption that QUD_0 and QUD_1 partition the same common ground). Both are raised by (25).

If a boundary is inserted before the last alternative like in (17), this affects constituency (see (v)), and *yoksa*'s prejacent is only B, which is part of the original QUD_0, thus rendering the question flat.

In AQs with four alternatives, with *yoksa* in the middle, pre-*yoksa* alternatives may be grouped or not, as in examples (12a) and (13a). *Yoksa* affects constituency by coordinating two nested coordinations:

(26) $[\![Q[[A \text{ MI B MI}] \textit{yoksa} \text{ } [C \text{ MI } D \text{ MI}]]]\!] = \{A, B, C, D\}$

The question raises $\text{QUD}_0 = \{A, B, C, D\}$. $[\![\textit{yoksa}]\!]$ requires that there is a QUD_1 such that $C \vee D \in [\![\text{QUD}_1]\!]$. QUD_1 is therefore a sub-QUD of QUD_0: both are raised by (26). Given these requirements, there are the following two possibilities for QUD_0: 1) $\{A \vee B, C \vee D\}$ (corresponds to (12a)); 2) $\{A, B, C \vee D\}$ (corresponds to (13a)). Neither violates *Minimize QUDs*, because there are only two QUDs in each case.

As for structured questions arising from prosody, I follow Wagner (2010) in saying that a difference in boundary strength indicates that the coordination is non-associative. Non-associativity in coordinations may have different sources, as briefly presented in section 2; in AQs, it may be most naturally correlated with QUD structure. Importantly, such a non-associativity inference has no reason to not be symmetrical. The specifics of the nature between non-associativity in AQs and internal QUD structure, and exactly how the prosody-semantic grouping isomorphism arises, are left for future work.

5. Conclusion

I have presented new data and proposed a prosodo-semantic account for grouping effects in a special type of coordination: structured alternative questions. These can be formed in two ways: from differences in strength of prosodic boundaries, that induce a non-associativity inference; from the semantics of the particle *yoksa*, that requires its prejacent to be a possible answer to a QUD: if this prejacent makes up more than one alternative, a second QUD is raised, subordinate to the one raised by the question.

This short paper points towards exciting lines of work in largely unexplored domains: utterance-internal QUD structure; the link between prosody and semantics in coordinations; the prosody and semantics of the ubiquitous pre-final connectives in coordinations, and how it compares across languages.

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