

Wh-reduplication in Korean and Khalkha Mongolian

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1 Introduction

- In some languages, wh-words may be reduplicated to indicate plurality:¹

- ▶ Wh-reduplication in Korean, e.g. (1) has been documented (see e.g. Chung 1999; Kim 1999a,b; Davis 2015)

(1) Korean
nwuku(+nwuku) -ka sakwa-lul kacyeo-ass-ni?
who+who-NOM apple-ACC bring-PST-Q
'Who (pl.) brought apples?'

- ▶ Wh-reduplication in Khalkha Mongolian, e.g. (2), is, to our knowledge, less well-known (see e.g. Haspelmath 1997, p.180, fn.10)

(2) Khalkha
hen(+hen) tsuivan id-sen be?
who+who.NOM tsuivan eat-PST Q
'Who (pl.) ate tsuivan (fried noodles)?'

- In multiple-wh questions (MWQs), wh-reduplication behaves differently depending on whether the context calls for a **single-pair** (3a) or **pair-list** (3b) answer

(3) Possible answers to the question: "Who brought what?"

a. *Single-pair answer*

Seoyeon brought apples.

b. *Pair-list answer*

Seoyeon brought apples, and JJ brought oranges.

- ▶ Davis 2015 describes and analyzes such patterns for Yaeyaman (Japonic)
- ▶ These patterns are under-described and not well-understood in Korean (cf. Kim 1999a; Davis 2015) and Khalkha

¹Wh-reduplication is also a common way for languages to form indefinites (e.g. Haspelmath 1997), which is not our focus here.

- **This talk:** we describe novel patterns of wh-reduplication in Korean and Khalkha MWQs
 - ▶ In Korean MWQs, wh-reduplication is licensed by non-atomic arguments²
 - ▶ In Khalkha MWQs, wh-reduplication is licensed by non-atomic answers
- Building on Davis’ 2015 analysis of wh-reduplication in Yaeyaman (Japonic), we argue that wh-reduplication involves one of two distinct semantic operations:
 - ▶ Local reduplication applies to sets of individuals
 - ▶ Clausal reduplication applies to sets of propositions
- We show that variation across languages depends on whether local or clausal reduplication is used in MWQs, as well as the properties of clausal reduplication

2 Data

- Korean: standardized variety, judgments from one speaker (first author)
 - Khalkha Mongolian: standardized variety in Mongolia, judgments from one speaker
 - Methodology: Elicitation with controlled context manipulation (Matthewson 2004)
 - ▶ We focus on MWQs in single-pair (4) and pair-list contexts (5) (see Appendix A for full set of contexts):
- (4) Single-pair Context A: (x, a)
 “You know that one person is going to bring something to your house today. Your mother is at home and you’re not, so she received the package for you. Can you ask her ‘who(+who) brought what(+what)?”’
- (5) Pair-list Context E (x, a), (y, b)
 “You are having a party and you invited 6 people. Each guest is asked to bring one food item. Your friend has been monitoring the door for guests as they arrive with their food. Can you ask her ‘who(+who) brought what(+what)?”’
- We show that Korean and Khalkha display different wh-reduplication patterns in MWQs than Yaeyaman (previously described by Davis 2015; see Appendix B)

²By ‘non-atomic’, we refer to sums of count atomic nouns. We set aside mass nouns and collective nouns in this talk.

2.1 Korean

- In MWQs, the subject (6b), or object (6c), or both (6d) wh-words may be reduplicated

(6) Korean

- a. *No reduplication*
 nwuka mwue-lul kacyeo-ass-ni?
 who.NOM what-ACC bring-PST-Q
- b. *Subject reduplication*
 nwukwu(+nwukwu)-ka mwue-lul kacyeo-ass-ni?
 who+who-NOM what-ACC bring-PST-Q
- c. *Object reduplication*
 nwuka mwue(+mwue)-lul kacyeo-ass-ni?
 who.NOM what+what-ACC bring-PST-Q
- d. *Dual reduplication*
 nwukwu(+nwukwu)-ka mwue(+mwue)-lul kacyeo-ass-ni?
 who+who-NOM what+what-ACC bring-PST-Q
 ‘Who brought what?’

- Non-reduplicated MWQ (6a) is acceptable in all single-pair and pair-list contexts
- In single-pair contexts, wh-reduplication of an argument is acceptable iff the corresponding member in the pair is non-atomic

Context	Acceptable wh-reduplication
A. (x, a)	-
B. (x+y, a)	(6b)
C. (x, a+b)	(6c)
D. (x+y, a+b)	(6d) ³

- Same pattern observed in pair-list contexts

Context	Acceptable wh-reduplication
E. (x, a), (y, b)	-
F. (x+y, a), (z+w, b)	(6b)
G. (x, a+b), (y, c+d)	(6c)
H. (x+y, a+b), (z+w, c+d)	(6d)

³Our judgments obtained for dual reduplication (6d) differ than that in Kim 1999b; Davis 2015, where dual reduplication is reported to only be compatible with a distributive reading, i.e. in pair-list contexts. Thus, we do not entertain Davis’ proposal that Korean wh-reduplication has a stronger requirement that rules out single-pair contexts.

2.2 Khalkha Mongolian

- In MWQs, subject reduplication is disallowed without object reduplication: (7b) is judged to be ungrammatical

- (7) Khalkha Mongolian
- No reduplication*
 hen yuu avchir-san be?
 who what bring-PST Q
 - Subject reduplication*
 * hen(+hen) yuu avchir-san be?
 who+who what bring-PST Q
 - Object reduplication*
 hen yuu(+yuu) avchir-san be?
 who what+what bring-PST Q
 - Dual reduplication*
 hen(+hen) yuu(+yuu) avchir-san be?
 who+who what+what bring-PST Q
 ‘Who brought what?’

- Non-reduplicated MWQ (7a) is acceptable in all single-pair and pair-list contexts
- However, any kind of wh-reduplication is disallowed in single-pair contexts

Context	Acceptable wh-reduplication
A. (x, a)	-
B. (x+y, a)	-
C. (x, a+b)	-
D. (x+y, a+b)	-

- Dual reduplication (7d) is allowed in all pair-list contexts
- Object reduplication without subject reduplication (7c) allowed only in specific pair-list context where there is an atomic subject and non-atomic object within each pair

Context	Acceptable wh-reduplication
E. (x, a), (y, b)	(7d)
F. (x+y, a), (z+w, b)	(7d)
G. (x, a+b), (y, c+d)	(7c), (7d)
H. (x+y, a+b), (z+w, c+d)	(7d)

2.3 Summary

- Korean (K) vs Khalkha Mongolian (M) (see Appendix B for comparison with Yaeyaman)

Table 5. Wh-reduplication in Korean and Khalkha Mongolian MWQs

		Subject		Object		Dual	
Context		K	M	K	M	K	M
Single-pair	A. (x, a)	#	*	#	#	#	#
	B. (x+y, a)	✓	*	#	#	#	#
	C. (x, a+b)	#	*	✓	#	#	#
	D. (x+y, a+b)	#	*	#	#	✓	#
Pair-list	E. (x, a), (y, b)	#	*	#	#	#	✓
	F. (x+y, a), (w+z, b)	✓	*	#	#	#	✓
	G. (x, a+b), (y, c+d)	#	*	✓	✓	#	✓
	H. (x+y, a+b), (w+z, c+d)	#	*	#	#	✓	✓

- Korean MWQs: Same wh-reduplication patterns in single-pair and pair-list contexts
 - ▶ Wh-reduplication is possible if the corresponding argument within the pair is non-atomic
- Khalkha MWQs: Two asymmetries
 - ▶ Reduplication of wh-subject is ungrammatical *without* reduplication of wh-object (dual reduplication)
 - ▶ Wh-reduplication is possible in pair-list contexts but not in single-pair contexts

3 Proposal

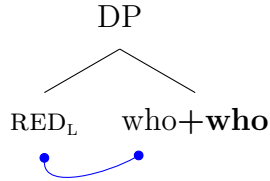
- Following Davis 2015, we propose that wh-reduplication is triggered by attaching a RED morpheme **locally to DP**, or **clausally to CP**
- However, we propose that there are two distinct RED morphemes due to the fact that they combine with different semantic objects⁴
 - ▶ RED_L attaches to a wh-word, and presupposes that there is at least one non-atom in the set being denoted by the wh-word
 - * Licensed by single-pair & pair-list contexts that meet the presupposition
 - * Applies to a set of context-sensitive alternatives *C* introduced by the wh-word and returns the same set (identity function)

⁴Davis 2015 argues that the same RED attaches to DPs and CPs. We assume there are two different semantic operations because (i) DPs (wh-words) denote a set of individuals (type < *et* >) while CPs (wh-questions) denote a set of propositions (type < *stt* >) and (ii) the presuppositional requirements for non-atomic answers seem to involve different truth-conditional restrictions than those for non-atomic individuals.

- (8) Logical translation of local RED_L
 $\lambda C_{\langle et \rangle}.C$
 Presupposition: $C \not\subseteq ATOMS$

* RED_L is null but reduplicates the wh-word it attaches to via Agree

- (9) $\llbracket \text{RED}_L \text{ who} \rrbracket = \text{“requires non-atomic individuals”}$
 Morphosyntax: Reduplication of wh-word



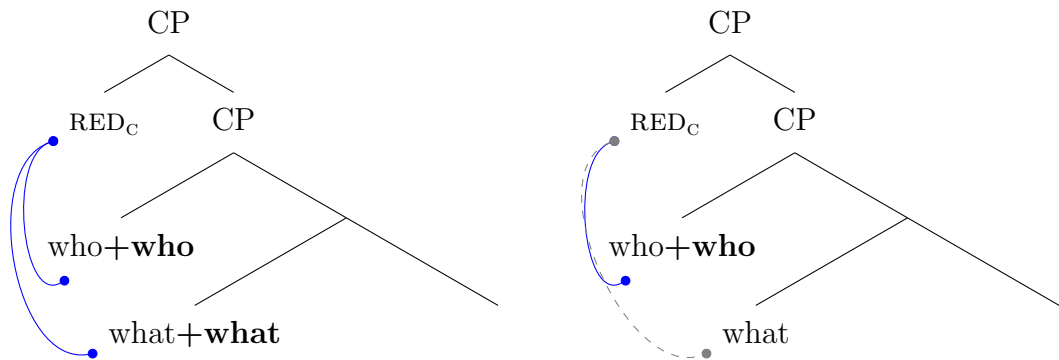
► RED_C attaches to CP, and presupposes that there are at least two different true propositions in the set such that the conjunction of them is an answer to the question being asked

- * Licensed by pair-list contexts that meet the presupposition
- * Applies to a set of propositions (Hamblin 1973) and returns the same set (identity function)

- (10) Logical translation of clausal RED_C
 $\lambda Q_{\langle stt \rangle} \lambda q_{\langle st \rangle}.Q(q)$
 Presupposition: $\exists p_1 \dots \exists p_n [Q(p_1 \wedge \dots \wedge p_n) \wedge (p_1 \neq \dots \neq p_n) \wedge (p_1(w_{0 \langle s \rangle}) = 1 \wedge \dots \wedge p_n(w_0) = 1)]$ and $n \geq 2$

* RED_C triggers reduplication of all or the closest wh-word(s) via Agree

- (11) $\llbracket \text{RED}_C \text{ CP} \rrbracket = \text{“requires non-atomic answers”}$
 Morphosyntax: Reduplication of all or closest wh-word(s)



- We also assume that non-reduplicated wh-words introduce a conversational implicature which “forces the inclusion of atomic alternatives” (Davis 2015, p.644)

Main takeaways:

- Two different operations: local RED_L and clausal RED_C
 - ▶ RED_L requires the existence of non-atomic individuals and reduplicates the wh-word it is attached to via Agree
 - ▶ RED_C requires the existence of non-atomic answers and reduplicates all or the closest wh-word(s) via Agree

3.1 Accounting for the data

- Korean: wh-reduplication must match the form of each & every pair in the context.
 - ▶ Korean uses local RED_L & it reduplicates the wh-word it attaches to
 - (12) Single-pair “who+who brought what+what?” (✓ context D (x+y, a+b))
 - a. Structure:
$$[_{CP} \dots [_{C'} C_{+WH} [[_{DP} \boxed{\text{RED}_L} \text{ who}] \text{ brought } [_{DP} \boxed{\text{RED}_L} \text{ what}]]]]$$
 - b. Denotation: a set of propositions
$$\{p | p = \text{brought}'(x, y) \wedge C_{\text{human}}(x) \wedge C_{\text{thing}}(y)\}$$
iff there is at least one non-atomic individual in each set C_{human} and C_{thing} ($C_{\text{human}} \not\subseteq ATOMS$ and $C_{\text{thing}} \not\subseteq ATOMS$)
→ satisfied only under the context D (x+y, a+b)
 - (13) Pair-list “who+who brought what+what?”
 - (✓ context H (x+y, a+b), (z+w, c+d))
 - a. Structure:
$$[_{CP} \dots [_{C'} C_{+WH\text{-functional}} [[_{DP} \boxed{\text{RED}_L} \text{ who}] \text{ brought } [_{DP} \boxed{\text{RED}_L} \text{ what}]]]]$$
 - b. Denotation: a set of propositions
$$\{p | \exists f_{\langle ee \rangle} [Dom(f) = \text{human} \wedge \forall x_{\langle e \rangle} [C_{\text{thing}}(f(x))] \wedge p = \cap \lambda p' \exists y \in C_{\text{human}} [p' = \text{brought}'(y, f(y))]]\}^5$$
iff there is at least one non-atomic individual in each set C_{human} and C_{thing} ($C_{\text{human}} \not\subseteq ATOMS$ and $C_{\text{thing}} \not\subseteq ATOMS$)
→ satisfied only under the context H (x+y, a+b), (z+w, c+d)
- Khalkha: i) wh-subject cannot be reduplicated *without* reduplicating wh-object; ii) wh-reduplication is only allowed in pair-list contexts
 - ▶ Khalkha uses clausal RED_C & RED_C Agrees with and reduplicates all wh-words
 - ▶ Subject reduplication w/o object reduplication (“who+who brought what?”) is ungrammatical because RED_C Agrees with and reduplicates all wh-words below it

⁵We follow Dayal 1996 proposal on the derivation of pair-list questions such that they are a kind of functional questions assuming pairs are in nature results from a function. The C head in questions are assumed to be ambiguous; C_{+WH} ($\lambda q \lambda p [p = q]$) derives single-pair questions, while $C_{+WH\text{-functional}}$ ($\lambda Q \lambda D \lambda R \exists f [Dom(f) = D \wedge \forall y [R(f(y))] \wedge p = \cap \lambda p' \exists y \in D [p' = Q(y)(f)]]$) derives functional questions as it defines the domain D and range R of the function f and the relation that holds between an individual and the function.

- (14) Pair-list “who+who brought what+what?” (✓ all pair-list contexts)
- a. Structure:
 $[_{CP} \overline{\text{RED}_C} [_{CP} \mathbf{who} \text{ brought } \mathbf{what}]]$
- b. Denotation: a set of propositions
 $\{p | \exists f [Dom(f) = human \wedge \forall x [C_{thing}(f(x))] \wedge p = \cap \lambda p' \exists y \in C_{human} [p' = brought'(y, f(y))]]\}$
 iff there are at least two different true answers in the set such that the conjunction of them is an answer to the question being asked
 $(\exists p_1 \dots \exists p_n [Q(p_1 \wedge \dots \wedge p_n) \wedge (p_1 \neq \dots \neq p_n) \wedge (p_1(w_{0<s>}) = 1 \wedge \dots \wedge p_n(w_0) = 1)] \text{ and } n \geq 2)$
 \rightarrow satisfied under all pair-list contexts.

Main takeaways:

- Different patterns are due to (i) the type of RED used in MWQs in the language, and (ii) whether it agrees with all or the closest wh-word
- Korean uses local RED_L that reduplicates the wh-word it is attached to
- Khalkha uses clausal RED_C that Agrees with and reduplicates all wh-words below it
- (See Appendix B for the other type of RED_C in Yaeyaman)

4 Concluding remarks

- We broaden the typology of wh-reduplication by discussing novel data from Korean and Khalkha Mongolian
- Building on Davis 2015, we propose that the variation in wh-reduplication patterns depends on:
 - ▶ Whether local RED_L or clausal RED_C is used in MWQs
 - ▶ Whether clausal RED_C agrees with all or the closest wh-word(s)
- Further research: wh-reduplication patterns in Korean and Khalkha Mongolian involving...
 - ▶ Different types of predicates (e.g. collective, ditransitive)
 - ▶ Mass nouns
 - ▶ Adjunct wh-words (e.g. when, where)

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Appendix A. Full set of contexts

The contexts below (with some modifications for each language) were first presented to our speaker consultants, followed by the target MWQ. The speaker was then asked to evaluate the felicity of the target MWQ in the given context.

- Single-pair

1. Context A: (x, a)

“You know that one person is going to bring something to your house today. Your mother is at home and you’re not, so she received the package for you. Can you ask her ‘who(+who) brought what(+what)?”’

2. Context B: (x+y, a)

“You know that two people are going to bring something to your house today. Your mother is at home and you’re not, so she received the package for you. Can you ask her ‘who(+who) brought what(+what)?”’

3. Context C: (x, a+b)

“You know that one person is going to bring two things to your house today. Your mother is at home and you’re not, so she received the two packages for you. Can you ask her ‘who(+who) brought what(+what)?”’

4. Context D: (x+y, a+b)

“You know two people are going to bring two things to your house today. Your mother is at home and you’re not, so she received the two packages for you. Can you ask her ‘who(+who) brought what(+what)?”’

- Pair-list

1. Context E: (x, a), (y, b)

“You are having a party and you invited 6 people. Each guest is asked to bring one food item. Your friend has been monitoring the door for guests as they arrive with their food. Can you ask her ‘who(+who) brought what(+what)?”’

2. Context F: (x+y, a), (z+w, b)

“Your friend is hosting a party. She invited you and your partner and 3 couples, but you don’t know them. Each couple is asked to bring one food item. You arrived the latest. Can you ask your friend ‘who(+who) brought what(+what)?”’

3. Context G: (x, a+b), (y, c+d)

“You are having a party and you invited 6 people. Each guest is asked to bring two food items. Your friend has been monitoring the door for guests as they arrive with their food. Can you ask her ‘who(+who) brought what(+what)?”’

4. Context H: (x+y, a+b), (z+w, c+d)

“Your friend is hosting a party. She invited you and your partner and 3 couples, but you don’t know them. Each couple is asked to bring two food items. You arrived the latest. Can you ask your friend ‘who(+who) brought what(+what)?”’

Appendix B. Wh-reduplication in Yaeyaman (Davis 2015)

- In Yaeyaman (Japonic), either the subject (15b), the object (15c), or both (15d) may be reduplicated

(15) Yaeyaman

- a. *No reduplication*
 taa=du noo=yu mucikee-riyaa
 who=FOC what=ACC brought-Q
- b. *Subject reduplication*
 taa(+taa)=du noo=yu mucikee-riyaa
 who+who=FOC what=ACC brought-Q
- c. *Object reduplication*
 taa=du noo(+noo)=yu mucikee-riyaa
 who=FOC what+what=ACC brought-Q
- d. *Dual reduplication*
 taa(+taa)=du noo(+noo)=yu mucikee-riyaa
 who+who=FOC what+what=ACC brought-Q
 ‘Who brought what?’

- In single-pair contexts, a non-atomic individual in the context licenses wh-reduplication

Yaeyaman - Single-pair Contexts	
Context	Acceptable wh-reduplication
(x, a)	-
(x+y, a)	(15b)
(x, a+b)	(15c)
(x+y, a+b)	(15d)

- In pair-list contexts, there is a subject-object asymmetry
 - Subject reduplication does not require subject non-atoms in the context
 - Object reduplication requires object non-atoms in the context

Yaeyaman - Pair-list Contexts	
Context	Acceptable wh-reduplication
(x, a), (y, b)	(15b)
(x+y, a), (z+w, b)	(15b), (15d)
(x, a+b), (y, c+d)	(15b), (15c)
(x+y, a+b), (z+w, c+d)	(15b), (15c), (15d)

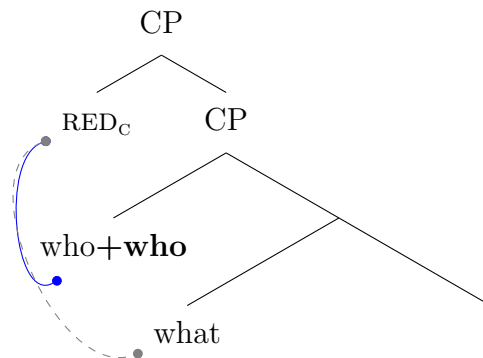
- Wh-reduplication in MWQs behaves differently in Yaeyaman (Y) than in Korean (K) and Khalkha Mongolian (M)

Table 6. Wh-reduplication in Korean, Khalkha Mongolian and Yaeyaman MWQs

Context		Subject			Object			Dual		
		K	M	Y	K	M	Y	K	M	Y
Single-pair	A. (x, a)	#	*	#	#	#	#	#	#	#
	B. (x+y, a)	✓	*	✓	#	#	#	#	#	#
	C. (x, a+b)	#	*	#	✓	#	✓	#	#	#
	D. (x+y, a+b)	#	*	✓	#	#	✓	✓	#	✓
Pair-list	E. (x, a), (y, b)	#	*	✓	#	#	#	#	✓	#
	F. (x+y, a), (w+z, b)	✓	*	✓	#	#	#	#	✓	#
	G. (x, a+b), (y, c+d)	#	*	✓	✓	✓	✓	#	✓	✓
	H. (x+y, a+b), (w+z, c+d)	#	*	✓	#	#	✓	✓	✓	✓

Key ideas from Davis’ proposal:

- A RED morpheme triggers wh-reduplication on the closest wh-word & introduces a presupposition that at least one member in the set RED applies to is non-atomic. ($\llbracket \text{RED } \alpha \rrbracket = \llbracket \alpha \rrbracket$ iff $\llbracket \alpha \rrbracket \not\subseteq \text{ATOMS}$)
- RED has two attachment sites: clausal and local.
 - ▶ Clausal RED presupposes the existence of a non-atomic answer.
 - ▶ Local RED presupposes the existence of a non-atomic individual.
- Further, Davis argues that clausal RED in Yaeyaman only Agrees with, and thus reduplicates, the closest wh-word
 - ▶ In MWQs, clausal RED will appear morphologically as subject wh-reduplication



- This explains the subject-object asymmetry in Yaeyaman MWQs:
 - ▶ Subject reduplication (due to clausal RED) does not need to be licensed by non-atomic subjects within each pair in the context
 - ▶ Object reduplication can only be due to local RED: requires non-atomic objects within each pair in the context
- Non-reduplicated wh-word also convey an implicature that the alternatives consist only of atomic individuals.

Appendix C. Object reduplication in Khalkha

- In Khalkha, object reduplication is allowed **only** under the pair-list context (x, a+b), (y, c+d), **but not** under the single-pair (x, a+b).

(16) hen yuu(+yuu) avchir-san be?
who what+what bring-PST Q
'Who brought what (pl.)?'

- a. ✓Seoyeon brought a pen and a pencil, and JJ brought an eraser and a notebook.
- b. #Seoyeon brought a pen and a pencil.

- Puzzles:
 - ▶ Clausal RED_C would not work, as it would trigger reduplication of wh-subject too.
 - ▶ Local RED_L on wh-object would not work, as it incorrectly predicts that (16) should be acceptable in the single-pair context (x, a+b).
- Attempt: a third attachment site?
 - ▶ Licensed by contexts that meet a presupposition that there is a non-atomic answer where every pair contains a non-atomic object individual
 - ▶ Applies to some level below the subject and above the verb predicate
 - ▶ Presupposes that there are at least two different true propositions in the set such that each proposition involves a non-atomic object individual and their conjunction is an answer to the question being asked.
- What do we need to posit to account for this phenomenon? What kind of additional data do we need to elicit? Any suggestions are welcome!