# Mixtures and implicature in Persian m-reduplication

**Introduction:** Persian possesses a type of full root reduplication that, when applied to a noun, results in a non-homogeneous plural inference; a reduplicated nominal is understood to refer to one or more objects in the denotation of the predicate denoted by the bare noun, as well as one or more objects that are similar in some respect to the bare noun. (1) is felicitous if Ali read one or more books, in addition to similar things, such as magazines.

1) Ali ketâb metâb xund
   Ali flower Red read.Pst
   'Ali gathered flowers and the like.'

Previous work on m-reduplication has mostly investigated its productivity with a number of syntactic categories, while taking the non-homogeneity inference as given (Armoskaite & Kutlu 2013). In this paper, I show that reduplication does *not* entail the non-homogeneity of the plurality it denotes. I propose that, semantically, m-reduplication denotes a *mereological mixture* of the set denoted by the bare nominal and a set of similar objects in the context. I then propose that the non-homogeneous plural reading is derived via scalar implicature. The analysis requires that the alternatives be (the cumulative closure of) the set denoted by the bare nominal and the similarity set, the latter of which does not correspond to a lexical item in the language. The phenomenon thus causes a problem for structural approaches to alternatives (Katzir 2007), and favors an approach making use of conceptual alternatives (Buccola et al. 2018).

**Implicature-cancelling environments:** While the non-uniformity inference is attested in upward-entailing environments as in (1), it vanishes in implicature-cancelling environments, such as under negation (2), in the antecedent of a conditional (3), in polar questions (4), and in the scope of a possibility modal (5). (2) is understood to mean that Ali didn't read any books *or* similar hings, rather than merely that he didn't read both books and something else. Likewise, in (3), the addressee may tell the speaker even if she has eaten only one or two apples, or a similar fruit.

2) Ali ketâb metâb na-xund
   Ali book Red Neg-read.Pst
   'Ali didn't read books or anything'

3) age sib mib bo- xor -i be man be- gu!
   if apple Red Sbjv-eat.Prs-2.Sg to 1.Sg Sbjv-say
   'If you eat an apple or something, tell me!'

One may felicitously answer 'yes' to the polar question in (4) even if one only ate one or two apples or a similar fruit; a negative answer is not felicitous. Finally, (5) allows for the possibility that Roya ate only an apple or two, or something similar.

4) Q: sib mib xord -i
      apple Red eat.Pst -2.Sg
      'Did you eat an apple or something?'
   A: Âre, ye/do tâ sib xord -am
      Yes one/two CL apple eat.Pst-1.Sg
      'Yes, I ate one/two apples'

5) Royâ shâyad sib mib bo- xor -e
   Roya might apple Red Sbjv- eat.Prs -3.Sg
   'Roya might eat an apple or something'

The interpretation of m-reduplication thus shows sensitivity to the direction of entailment, just like English bare plurals (Krifka 2004; Spector 2007l Zweig 2009).

**Ignorance contexts:** Even in upward-entailing contexts, the non-homogeneity inference can be elimnated in contexts establishing speaker ignorance, as in (6).

6) Context: you see Sepideh carrying a lunchbox, in which she often carries an apple for an afternoon snack, but sometimes brings other frutis along with it. You don't know exactly how many fruits she has in the box, nor are you sure if she has anything but apples or in it.

Sepideh sib mib dâr -e
Sepideh apple Red have.Prs-3.Sg
'Sepideh has an apple or something.'

Here, the speaker is not necessarily committed to Sepideh having more than one apple, nor is she committed to her having anything but apples or just a similar kind of fruit.

**Analysis:** I propose that m-reduplicated nominals be analyzed as *mereological mixtures* of the set denoted by the bare nominal and the set of objects similar to it in the context. First, the similarity set will simply be a set of objects with some property similar to the bare nominal, and will be denoted P˜. Here, the similarity set is defined not to include the set denoted by the bare nominal itself.

7) Similarity set

$[\![P˜]\!] = \{x \mid \exists Q: Q \sim_C P \& Q(x) \& P \neq Q\}$

Second, I define a *mixture* of two sets P and Q as the set of sums of elements from the cumulative closures of P and Q. A mixture will thus include both *P and *Q as subsets, in addition to sums of elements from each set, and thus differs from the definition of mixture in Champollion (2015), in which mixtures contain only the latter set of mixed sums (8a). I further treat the mixture as a predicate (8b).

8) Mixture

a. $[\![Mix(P,Q)]\!] = \{X \oplus Y \mid X, Y \in {}^*P \cup {}^*Q$     b. $[\![Mix(P,Q)(t)]\!] = 1$ iff $[\![t]\!] \in [\![Mix(P,Q)]\!]$

I propose that m-reduplication denotes the mixture of the set denoted by the bare nominal and its similarity set, as in (9a), with a translation of (1) given in (9b). This captures the interpretation of m-reduplication in implicature-cancelling environments and ignorance contexts.

9) a. $[\![RED]\!] = \lambda P.\lambda X.Mix(P,P˜)(X)$     b. $\exists X[Mix(Book,Book˜)(X) \& {}^*Read(X)(a)]$

The next step is to derive the non-homogeneous plural interpretation of (1). To derive this interpretation, the set denoted by the bare noun and its similarity set need to be excluded, leaving only the set of sums of book and book-like objects. While the former is in principle derivable via a structural approach to alternatives (Katzir 2007), either by deletion of the reduplicative morpheme in the syntax, or by replacement of the reduplicative morpheme with the cumulative closure operator, the latter is an abstract alternative, and does not correspond to any particular lexical item in the language. It is therefore not derivable via a sequence of deletions and replacements applying to the structural representation of the sentence.

I propose instead that the alternatives to m-reduplication are derived via operations on the *conceptual* representation of the expression in a language of thought, similarly to the approach discussed in Buccola et al. (2018). Because *P and *P˜ are present in the conceptual representation of the mixture, they count as alternatives to m-reduplication. I combine this with the notion of exhaustification (Fox 2007), defined in (10).

10) $[\![Exh(p)(A)]\!] = p \& \forall q: q \in IE(A) \rightarrow \neg q$

Both *P and *P˜ are innocently excludable, as their negation does not lead to contradiction of the main assertion, so applying exhaustification to (9b) will lead to the following representation in (11).

11) $[\![Exh(9b)(A)]\!] = \exists X[Mix(Book,Book˜)(X) \& {}^*Read(X)(a)]$

     $\& \neg \exists X[Book(X) \& {}^*Read(X)(a)] \& \neg \exists X[Book˜(X) \& {}^*Read(X)(a)]$

(11) means that Mohsen read at least one thing in the mixture of books and book-like objects, he did not read something in the set of books, nor did he read something in the set of book-like things. This means that Mohsen must have read one of the book/book-like sums, which is the non-homogeneous plural interpretation.

**References: Buccola, B., Križ, M., & Chemla, E. (2018).** Conceptual alternatives: Competition in language and beyond.; **Fox, D. (2007).** Free choice and the theory of scalar implicatures. In *Presupposition and implicature in compositional semantics* (pp. 71-120). Palgrave Macmillan, London. **Katzir, R. (2007).** Structurally-defined alternatives. *Linguistics and Philosophy*, 30(6), 669-690.; **Krifka, M. (2004).** Kinds of Kind

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