Additive Prejecent and/or Additive Alternatives:
A Principle and a Parameter in Mandarin and Japanese

[Context:] Universal quantificational particle *mo* in Japanese has obtained much attention (see for example, Shimoyama 2006; Szabolci 2015, among others) due to its various functions. Not only does it appear in universal quantification, it also appears in additive and high-degree constructions (as reviewed below). We argue that these various functions are a result of applying the same semantic component in different ways. The argument is supported by a comparison between *mo* and Mandarin particles *ye*/*dou*. This study offers an explanation on how the difference between the two languages is derived, which in turn reveals options allowed for natural language semantics.

[Data:] We lay out the relevant data in (1)-(6), where Japanese examples are in the left column and Mandarin data are on the right. As seen in the Japanese examples, *mo* appears in all of the three constructions in question ((5)/(6) implies that 100 is a contextually high number). In Mandarin, *ye* but not *dou* appears in the additive construction. However, *ye* cannot appear in the other two constructions and *dou* has to be used there.

Additive: 'John also came.'

(1) *John-**mo** kita.*
John-ADD come.PAST

(2) *John **ye/*dou** lai-le.*
John YE/DOU come.PERF.

Indeterminate universal quantification: 'Everyone came'

(3) *Dare-**mo**-ga kita.*
Who-MO-NOM come.PAST.

(4) *Shei **dou/*ye** lai-le.*
who DOU/YE come-PERF

High degree: 'As many as 100 people came.'

(5) *100-nin-**mo** kita.*
100-person-MO come.PAST.

(6) *100-ge-ren **dou/*ye** lai-le.*
100.CL-PERSON DOU/YE come-PEEF

[Summary of Proposal:] We propose that *dou* and *ye* have the **same** semantic component which applies to a **different** part of the meaning. Namely, they contain $\neg O$ (O for the covert 'only' (Chierchia 2015 a.o.)) in their meaning. *Dou* applies $\neg O$ to its *sub-alternatives*, while *ye* applies it to its prejacent. *Mo*, on the other hand, can do both. The proposal is illustrated in detail below.

(7) a. *dou p* $\rightsquigarrow \lambda w.\ p(w) = 1 \wedge \forall q \in \textsc{sub}(p)[\neg O(q)(w) = 1]$ (Xiang 2020, simplified)
b. *ye p* $\rightsquigarrow \lambda w.\ \neg O(p)(w) = 1$
c. *mo p* $\rightsquigarrow$ (7a) and (7b)

[Background]: There have been extensive studies on *dou* (Giannaikidou & Cheng 2006; Liao 2011; Lin 1998; Liu 2016; Xiang 2008 a.o.), but we specifically follow Xiang (2020) for its semantics, though we abstract away irrelevant details. Xiang proposed (7a) for *dou*. Its first conjunct just asserts that the prejacent is true. The crucial contribution of *dou* lies in the second conjunct. There, $\textsc{sub}(p)$ returns a set of p's *sub-alternative* propositions q, where a sub-alternative of p is a proposition that is entailed by p. Thus, the second conjunct requires that for every such alternative q, $\neg O(q)$ is true. The semantics of O is spelled out as (8). $O(q)$ presupposes the truth of q, and asserts that for every alternative r of q, if r is true then r is entailed by q, i.e., q is the strongest true alternative. In the second conjunct of (7a), $O(q)(w)$ is negated. Through an elementary logic, (7a) is equivalent to (9). Notice that (9) still asserts the truth of each sub-alternative q. This is because the truth of alternative q is presupposed in (8). The negation in $\neg O(q)(w)$ does not negate the truth of q.

(8) $O(q) \rightsquigarrow \lambda w: q(w)=1. \forall r \in \text{ALT}(q)[r(w)=1 \rightarrow q \subseteq r]$, where $\subseteq$ stands for 'entails'.

(9) (7a) = $\lambda w.\ p(w)=1 \wedge \forall q: q \in \text{SUB}(p) \wedge q(w)=1\ [\exists r \in \text{ALT}(q)\ [q \nsubseteq r \wedge r(w)=1]]$

In (9), each q has a stronger or distinct alternative r such that r is true. Notice, thus, the requirement $\neg O(q)$ ends up being the additive meaning. Intuitively, thus, *dou p* requires that p is true and for every sub-alternative q, q is true and something stronger than or distinct from q is true.

For illustration, consider (4) and how the proposal derives the universal quantificational reading. Xiang updated Shimoyama's (2006) proposal and took the wh-phrase *shei* there as a sum of all the relevant individuals. Suppose that our contextually salient domain D contains three individuals, a, b, and c. Then *shei* denotes the summed individual $\text{a} \oplus \text{b} \oplus \text{c}$, so (4) will have the representation in (10a). Combined with the definition in (7a)/(9), (10a) for its truth requires that '$\text{a} \oplus \text{b} \oplus \text{c}$ *came*' is true, and for each alternative q in the set specified in (10b), q is true and q has the stronger true alternative (due to the additivity). The additive requirement is met by the assertion p. It then entails that all of the individuals in the domain came, hence universality.

(10) a. *dou* $[_p\ \text{a} \oplus \text{b} \oplus \text{c}$ *came* $]$

b. $\text{SUB}(p) = \{\text{a} \oplus \text{b}\ \textit{came},\ \text{b} \oplus \text{c}\ \textit{came},\ \text{c} \oplus \text{a}\ \textit{came},\ \text{a}\ \textit{came},\ \text{b}\ \textit{came},\ \text{c}\ \textit{came}\}$

[Proposal:] In order to derive the universal reading and the high-degree reading of *mo*, (see Xiang (2020) for the way to derive the high-degree reading), we argue that *mo* can have the same denotation as *dou*, as specified in (7a). This argument is supported by the fact that *mo* and *dou* share the property of distributivity: *wh dou/mo P* does not allow a collective interpretation of *P*, even if *P* is ambiguous between collective and distributive readings. This is shown in the infelicity of (11) in the given context. The distributivity is derived in Xiang (2020) due to the requirement of the truth of sub-alternatives. As seen in (9), *dou* requires the predicate to be true of each atominc individual in the domain, hence distributivity.

(11) *Dare-mo-ga ie-o katta.*
wh-MO-NOM house-ACC buy.PAST
'Everyone bought a house'. **Infelicitous** if people bought one house together.

However, Xiang's definition by itself does not derive the additive reading in (1)/(2). We argue that the additive reading results from a different but closely related definition. Namely, in the additive use $\neg O$ is applied to the prejacent, as in (12a). Again with a logical transformation, it ends up (12b), hence the additivity.

(12) a. $mo_{\text{ADD}}\ p \rightsquigarrow \lambda w.\ \neg O(p)=1$

b. $\rightsquigarrow \lambda w. p(w)=1\ \wedge\ \exists q[p \nsubseteq q\ \wedge\ q(w)=1]$

Thus, *mo* applies the $\neg O$ requirement *either* to its prejacent (as in (12)) or to its sub-alternatives as (7a). The paradigm in (1)-(6), we argue, shows that these two applications are carried out by different lexical items in Mandarin: *dou* obligatorily applies $\neg O$ to its alternatives as in (7a), while *ye* obligatorily applies it to its prejacent as in (7b)/(12).

[Conclusion:] We proposed the parametrization on the application of $\neg O$. Theoretically, the proposal further implies that the application of $\neg O$ is a universally available semantic inventory, and that the application of $\neg O$ is subject to parametrization among languages/lexical items.

[Selected References:] Xiang. Y. 2020. *Functional Alternations of the Mandarin Particle dou: Distributer, Free Choice Licensor, and 'Even'*. Journal of Semantics, 37. 171-217