

## DOMAIN RESTRICTION IN FREEDOM OF CHOICE: A VIEW FROM KOREAN *Indet-na* ITEMS\*

Min-Joo Kim  
Texas Tech University  
min-joo.kim@ttu.edu

Stefan Kaufmann  
Northwestern University  
kaufmann@northwestern.edu

### Abstract

The Korean Free Choice Items (FCI) *nwukwu-na* and *amwu-na* are composed of the indeterminates *nwukwu/amwu* and the particle *-na*. These items are particularly interesting from the perspective of the theory of FCI for at least two reasons: First, while both share the general meaning of “free choice,” they exhibit important differences in detail which highlight the multifaceted nature of this category. Second, their relatively transparent morphological structure calls for a compositional analysis which locates the source of the differences between them in the indeterminates *nwukwu* and *amwu* and gives a unified analysis to the particle *-na*. This is a challenge because it means that while the particle is the source of the “free choice-ness” of the compounds, it cannot be held responsible for certain properties that are considered typical of FCI in general, yet are not shared by both *nwukwu-na* and *amwu-na*. In this paper, we present an overview of several semantic difference between the items, followed by a formal analysis of some of those differences, specifically regarding their implicatures with respect to intensionality and counterfactuality.

### 1 Introduction

The two most common FCIs in Korean are *nwukwu-na* and *amwu-na*. These items consist of an indeterminate (henceforth Indet) and a disjunctive particle *-na*. The Indet and the particle together produce the meaning of a FCI, which can be roughly translated into ‘anyone’ in English, as shown in (1) and (2).<sup>1</sup>

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|---|---|
| <p>(1) Mina-nun amwu-na manna-ss-ta.<br/>M.-Top amwu-NA meet-Pst-Decl<br/>Mina met anybody.</p> | <p>(2) Mina-nun nwukwu-na manna-ss-ta.<br/>M.-Top nwukwu-NA meet-Pst-Decl<br/>Mina met anybody.</p> |
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<sup>1</sup>The make-up of FCIs is paralleled by the corresponding NPIs, which consist of an Indet and the so-called additive particle *to*, as shown in (i) and (ii).

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|---|--|
| <p>(i) Mina-nun amwu-to manna-ciahnss-ta.<br/>M.-Top amwu-TO meet-Neg.Pst-Decl<br/>Mina did not meet anybody.</p> | <p>(ii) Mina-nun nwukwu-to manna-ciahnss-ta.<br/>M.-Top nwukwu-TO meet-Neg.Pst-Decl<br/>Mina did not meet anybody.</p> |
|---|--|

*Amwu-to* and *nwukwu-to* are called NPIs because they require negation to be licensed, as illustrated by the contrast between (i)-(ii) and (iii)-(iv), respectively.

- |  |   |
|--|---|
| <p>(iii) *Mina-nun amwu-to manna-ss-ta.<br/>M.-Top amwu-TO meet-Pst-Decl<br/><i>Intended</i>: Mina met (just) anybody.</p> | <p>(iv) *Mina-nun nwukwu-to manna-ss-ta.<br/>M.-Top nwukwu-TO meet-Pst-Decl<br/><i>Intended</i>: Mina met (just) anybody.</p> |
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The existence of these two FCIs in the same language and their morphological make-up raise at least two questions. One is: how are they similar to and/or different from each other? Second, how do their meanings come about compositionally?

In this paper, we aim to point out some important differences between the two FCIs in Korean. In addition, we seek to account formally for some of their differences within a dynamic semantics framework.

This paper consists of three sections. Section 2 is devoted to presenting the facts surrounding the FC phenomenon exhibited by *nwukwu-na* and *amwu-na*. Section 3 presents a dynamic semantic analysis of these items. Section 4 summarizes and concludes the paper.

## 2 The facts

We begin this section by providing some preliminary information on the Indet's without the particle *-na*, *i.e.*, differences between *amwu* and *nwukwu*. Next we present some semantic properties of *-na* that will prove to be useful for our semantic analysis of the two FCIs. Lastly, we point out several important differences between *amwu-na* and *nwukwu-na*, some of which we aim to account for in this paper, specifically regarding their implicatures with respect to intensionality and counterfactuality.

### 2.1 Differences between *amwu* and *nwukwu*

There are two differences between *amwu* and *nwukwu*. First, given (1) and (2), it appears that they both mean something like 'someone'. Unlike *nwukwu*, however, *amwu* also has an adnominal usage in which it co-occurs with nouns that denote sets of non-humans. To see this, compare (3) and (4).

- |     |    |                               |     |    |                                 |
|-----|----|-------------------------------|-----|----|---------------------------------|
| (3) | a. | Amwu (salam)-na: 'any person' | (4) | a. | Nwukwu-na 'any person'          |
|     | b. | Amwu chayk-ina: 'any book'    |     | b. | Atten/enu chayk-ina: 'any book' |
|     | c. | Amwu kos-ina: 'any place'     |     | c. | Atten/enu kos-ina: 'any place'  |
|     | d. | Amwu ttay-na: 'any time'      |     | d. | Atten/enu ttay-na: 'any time'   |

The other notable difference between the two Indet's is that *nwukwu* can occur as a free-standing indefinite, receiving either a specific or a non-specific interpretation. In contrast, this use is not available with *amwu*. This is illustrated in (5) and (6). (5) shows that *nwukwu* can be translated as 'someone specific/non-specific' or as 'who' in English, depending on the intonation, which serves as a marker of a declarative sentence or an interrogative sentence in Korean. On the other hand, (6) shows that *amwu* can never have such interpretations, regardless of the intonation of the sentence.

- (5) Nwukwu(-ka) ow-ass-e.  
 nwukwu(-nom) come-Pst-Decl  
*With neutral intonation:* Someone or other has come. / Someone specific has come.  
*With rising intonation:* Has someone/anyone come? / Who has come?
- (6) \*Amwu(-ka) ow-ass-e.  
 amwu(-nom) come-Pst-Decl  
*With neutral intonation:* Someone or other has come. / Someone specific has come.  
*With rising intonation:* Has someone/anyone come? / Who has come?

## 2.2 Semantic properties of *-na*

Korean *-na* usually occurs as a disjunctive particle. This is illustrated in (7) and (8), in which it selects for nominal categories and verbal categories, respectively.

- (7) Swuni-na Chelho-ka ppang-ul mek-ess-ta.  
 S.-NA C.-Nom bread-Acc eat-Pst-Decl  
 Swuni or Chelho ate the bread.
- (8) Swunhi-nun nolayhake-na chwumchwu-ess-ta.  
 S.-Top sing-NA dance-Pst-Decl  
 Swunhi sang or danced.

In addition to occurring as a disjunctive particle, *-na* has two other important usages. First, it occurs as part of adverbs of quantification, yielding a distributive and universal interpretation for the sentence in which it occurs. This is shown in (9). In this sentence, together with *ence*, which is also an Indet, *-na* yields the meaning of ‘always’.

- (9) Mary-nun achim-ey ence-na wuywu-lul mashi-n-ta.  
 M.-Top morning-Loc indet-NA milk-Acc drink-Non.Pst-Decl  
 As for Mary, she always drinks milk in the morning.

Second, *-na* exhibits the behavior of an unselective binder in the sense that when there is more than one Indet in its scope, it binds all of them. This is illustrated in (10). In this sentence, *-na* binds both *ence* ‘when’ and *etise* ‘where’, turning them into the analog of ‘whenever’ and ‘wherever’, respectively.

- (10) Mary-nun ence etise-na wuywu-lul mashi-n-ta.  
 M.-Top Indet Indet-NA milk-Acc drink-Non.Pst-Decl  
 Mary drinks milk whenever and wherever possible.

## 2.3 Differences between *nwukwu-na* and *amwu-na*

The two FCIs differ from each other in at least five respects. First, *nwukwu-na* appears to carry only universal Quantificational Force (QF), whereas *amwu-na* can also carry existential QF (Choi, 2005). Compare (11) and (12).

- (11) Nwukwu-na teylle o-la.  
 Nwukwu-NA bring come-Imp  
 Bring everyone regardless of who he/she is.
- (12) Amwu-na teylle o-la.  
 Amwu-NA bring come-Imp  
 Bring one person whoever it is (*but okay to bring more than one person.*)

Second, while *nwukwu-na* takes scope over negation, *amwu-na* takes scope under it.

- (13) John-un nwukwu-na manna-ci ahn-ess-ta.  
 J.-Top nwukwu-NA meet-CI Not.do-Pst-Decl.  
 ✓ For all x, John didn’t meet x, regardless of who x is. ( $\forall > \neg$ )  
 ✗ It is not the case that for all x, John met x, regardless of who x is. ( $\neg > \forall$ )

- (14) John-un amwu-na manna-ci ahn-ess-ta.  
 J.-Top amwu-NA meet-CI Not.do-Pst-Decl.  
 ✗ For all x, John didn't meet x, regardless of who x is. ( $\forall > \neg$ )  
 ✓ It is not the case that for all x, John met x, regardless of who x is. ( $\neg > \forall$ )

Third, *nwukwu-na* can occur anywhere but *amwu-na* cannot. More specifically, as a subject, *amwu-na* requires intentional contexts, as illustrated by the contrast between (15) and (16).

- (15) Nwukwu-na Seoul-tay-ey iphakhay-ss-ta.  
 Indet-NA Seoul-university-Goal enter-Pst-Decl  
 Anybody/everybody entered Seoul National University.
- (16) \*Amwu-na Seoul-tay-ey iphakhay-ssta.  
 Indet-NA Seoul-university-Goal enter-Pst-Decl  
*Intended:* Anybody entered Seoul National University.

It is important to note that subtriggering does not improve upon (16) whereas intensionality does, as shown by the contrast between (17) and (18).

- (17) \*Yelshimhi kongpwuha-Ø-n amwu-na Seoul-tay-ey Iphakhay-ssta.  
 Hard study-Prf-Rel Indet-NA Seoul-university enter-Pst-Decl  
*Intended:* Anybody who worked hard entered Seoul National University.
- (18) (Yelshimhi kongpwuha-myen) amwu-na Seoul-tay-ey Iphakha-l swu  
 Hard study-if Indet-NA Seoul-university enter-Rel possibility  
 iss-ta.  
 exist-Decl  
 Anybody can enter Seoul Nat'l (if he/she works hard).  
*Lit.:* There is a possibility that anybody can enter Seoul Nat'l (if he/she works hard.)

Turning now to the occurrence of *amwu-na* in object position, at first glance, it appears to be less restricted, as it can occur in episodic contexts, just like *nwukwu-na* does, as shown in (19) and (20).

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|--|--|
| <p>(19) John-un nwukwu-na sakwi-ess-ta.<br/>         J.-Top Indet-NA date-Pst-Decl<br/>         John went out with anybody<br/>         (available).</p> | <p>(20) John-un amwu-na sakwi-ess-ta.<br/>         J.-Top Indet-NA date-Pst-Decl<br/>         John went out with anybody<br/>         (available).</p> |
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On closer examination, however, it turns out that the occurrence of *amwu-na* in object position is also restricted, since it has to be selected by a volitional predicate. To see this, consider (21) and (22) in comparison with (19) and (20). These data show that while *nwukwu-na* is fine with either a non-volitional predicate or a volitional predicate, *amwu-na* can only occur as the object of a volitional predicate.

- (21) John-un nwukwu-na macwuchi-ess-ta.  
 J.-Top Indet-NA run.into-Pst-Decl  
 John ran into anybody.
- (22) \*John-un amwu-na macwuchi-ess-ta.  
 J.-Top Indet-NA run.into-Pst-Decl  
*Intended:* John ran into anybody.

It is important to note that neither subtriggering nor the presence of an epistemic modal operator improves upon the ungrammaticality of a sentence like (22), in which *amwu-na* occurs as the object of a non-volitional predicate. The operator at hand must have something to do with one's desire or wish. This is illustrated by the grammatical difference between (23)-(24) and (25). (23) and (24) involve subtriggering and the occurrence of an epistemic modal operator; (25) illustrates the occurrence of a desiderative modal operator.

- (23) \*John-un yeppu-n amwu-yeca-na macwuchie-ss-ta.  
 J.-Top pretty-Stat.Rel Indet-woman-NA run.into-Pst-Decl  
*Intended:* John ran into any woman who was beautiful.
- (24) \*John-un amwu-yeca-na macwuch-il swu iss-ta.  
 J.-Top Indet-woman-NA run.into-Fut.Rel possibility exist-Decl  
*Intended:* John can run into any woman.  
 (*Lit.:* There is a possibility that John can run into any woman.)
- (25) John-un amwu-yeca-na macwuchiki-lul huymangha-n-ta.  
 J.-Top Indet-woman-NA run.into-Nml-Acc hope.to-N.Pst-Decl  
 John hopes to run into any woman.

The fourth difference between *amwu-na* and *nwukwu-na* is that while the former triggers a counterfactual implicature, the latter generally does not do so (although there are some subtleties to which we will return in Section 3). To illustrate, consider again (19) and (20) above. While (19) implicates that if there had been more people, John would have met them as well, (20) does not necessarily do so.

Lastly, the two FCIs differ from each other with respect to scalar implicature. What this means is that the truth of the assertion that *amwu-na* has some property requires that any individual that is below the norm also has that property. This is not the case with *nwukwu-na*. To see this, consider (26) and (27). Imagine that (26) is uttered in a context where a traditional Korean father is speaking to his spinster daughter, who is turning forty. Given this context, this sentence can be understood to mean that he would not mind much even if his daughter brings home a man who turns out to be an idiot, as long as she is going to marry him.

- (26) Amwu-na teylie ow-la.  
 Indet-NA bring come-Imp  
 Bring anybody (even if he's an idiot).

Consider now (27). Notice that this sentence does not carry such a scalar implicature. For that reason, the sentence will be judged felicitous only if it is uttered in a rather unusual context such as in a context where the daughter is dating several medical doctors and the father wants to meet every one of them to examine them thoroughly.

- (27) Nwukwu-na teylie ow-la.  
 Indet-NA bring come-Imp  
 Bring everyone (so that we can do a thorough comparison.)

The semantic difference between (26) and (27) shows that while the quantification in *amwu-na* includes marginal individuals, that in *nwukwu-na* does not.

Table 1: Differences between *amwu-na* and *nwukwu-na*

	<i>Amwu-na</i>	<i>Nwukwu-na</i>
Quantificational force	$\forall, \exists$	$\forall$
Scopal interaction with negation	$\neg > \forall$	$\forall > \neg$
Distributional restriction	Certain modal contexts only	Anywhere
Counterfactual implicature	Yes	Not really
Scalar implicature	Yes	No

## 2.4 Summary

In this section, we have shown that the Indets *amwu* and *nwukwu* without the particle *-na* exhibit some interesting differences, one of them being that unlike *amwu*, *nwukwu* can be used on its own as an indefinite pronoun. We have also shown that *-na* carries not only a disjunctive meaning but also a distributive and universal meaning. Finally, we have shown that *amwu-na* and *nwukwu-na* differ from each other in at least five respects, which are summarized in Table 1.

## 3 Analysis

The previous sections outlined a number of observations on the semantic behavior of *amwu-na* and *nwukwu-na*. In the remainder of the paper, we propose a formal analysis of some of these facts. We are not able to give due consideration to all the facts mentioned above, in part due to space limitations and in part because some the full analysis is still under construction. A more detailed discussion is left for the full version of the paper. Here, instead, we will focus on one particularly salient difference between the two FCIs, *viz.* their different implications with regard to intensionality and counterfactuality.

Specifically, recall that *amwu-na*, unlike *nwukwu-na*, carries a strong counterfactual implicature, as evidenced by examples like (19) and (20) above. In contrast, to simplify somewhat, *nwukwu-na* has a more “extensional” flavor. This latter statement must be qualified somewhat because, as we will discuss below, counterfactual implicatures are not entirely absent from sentences with *nwukwu-na*. Thus the difference is subtle, and an analysis that does justice to it is not entirely straightforward.

Our analysis borrows some standard notions from dynamic semantics, most crucially the use of world-assignment pairs as “possibilities” in the model theory. The typical use of this framework is to model the dynamic effects of the introduction of new discourse referents. Since the Korean FCIs we are discussing here do not have such a discourse effect – no new discourse referent remains after the sentence has been processed – our analysis will not be “externally” dynamic in this sense. Instead, the property of the dynamic model which is most useful for our purposes is its seamless integration of modality and quantification, the two dimensions of meaning whose interplay is so important in understanding the meaning of free choice.

The way in which we develop the formal account proceeds in three steps: First, following standard practice in dynamic semantics, we give an interpretation of the items relative to *sets of possibilities*. In dynamic semantics, such sets of possibilities are typically conceived of as states of partial information. For our purposes, it is better to think of them as *modal bases* (Kratzer, 1981), a more general notion which subsumes information states as a special case. Secondly, since we ultimately want to give a definition of *truth* rather than *belief*, we do away with the assumption that the modal base comprises multiple worlds, and give an interpretation relative to



single possibilities. It is at that point that we will introduce our account of the difference between the two indeterminates in terms of intensionality. In the third step, we move back to sets of non-singleton modal bases to account for the circumstances under which the items are typically used. In doing so, we will apply our interpretation rule for single possibilities *pointwise* throughout the modal base. We conclude with a brief discussion of some of the facts that we could not address in this paper.

### 3.1 Formal basics

To prepare the ground for the analysis, we define some basic notions, all of which are standard fare in dynamics. Specifically, we adopt some notions from Groenendijk, Stokhof and Veltman (1996) (henceforth GSV).<sup>2</sup> The basic building blocks for the model are three disjoint non-empty set  $W$  (worlds),  $D$  (individuals), and  $\mathbb{X}$  (potential discourse referents). We assume that the domain  $D$  of individuals is constant across all worlds. The set of *possibilities* is defined as  $I = \{\langle w, g \rangle \mid w \in W, g \in D^X, X \subseteq \mathbb{X}\}$ , i.e., pairs consisting of a world  $w$  and a partial function  $g$  from some set  $X \subseteq \mathbb{X}$  of discourse referents into the domain of individuals. A *modal base* is a set of possibilities.

The introduction of a new discourse referent with assignment to a specific individual is modeled via a relation  $[x/d]$  between possibilities, defined for all  $x \in \mathbb{X}$  and  $d \in D$  as follows:

$$(28) \quad \langle w, g \rangle [x/d] \langle w', g' \rangle \text{ iff}$$

– $w = w'$ ;	(both possibilities share the same world)
– $x \notin \text{dom}(g)$ and $\text{dom}(g') = \text{dom}(g) \cup \{x\}$ ;	( $x$ is a “fresh” referent)
– $g'(x) = d$ ;	( $x$ is assigned to $d$ )
– $g(y) = g'(y)$ for all $y \neq x$ .	( $g$ and $g'$ differ only in their assignment to $x$ )

Based on this relation between possibilities, we define a “referent activation” update operation on modal bases as follows: For all  $s \subseteq I$ ,  $s[x/d] = \{i[x/d] \mid i \in s\}$ . As an auxiliary notion for dealing with complex sentences, we say that the set of *descendants* of  $i \in s$  in  $s[\varphi]$  is  $\{i\}[\varphi]$ , and  $i \in s$  *subsists* in  $s[\varphi]$  iff it has descendants in  $s[\varphi]$ .<sup>3</sup>

The dynamic effect of the assertion of an atomic sentence  $Px$  on a modal base is eliminative. Negation and conjunction are interpreted as usual.

$$(29) \quad \begin{array}{ll} \text{a.} & s[Px] = \{\langle w, g \rangle \in s \mid g(x) \in P_w\} \\ \text{b.} & s[\neg\varphi] = \{i \in s \mid i \text{ does not subsist in } s[\varphi]\}. \\ \text{c.} & s[\varphi \wedge \psi] = s[\varphi][\psi] \end{array}$$

Most relevant for our purposes is GSV’s treatment of indefinites. A sentence like (30-a) is roughly translated as (30-b), of the general form ‘ $\exists x.\varphi$ ’.

$$(30) \quad \text{a.} \quad \text{A student walked in.}$$

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<sup>2</sup>To simplify matters, we do not use “referent systems.”

<sup>3</sup>Our definition of “descendants” departs from GSV’s and does not work for their treatment of modal operators. GSV interpret  $[\Diamond\varphi]$  “globally” as a *test* on the input state:  $s[\Diamond\varphi] = s$  if  $s[\varphi] \neq \emptyset$ , and  $\emptyset$  otherwise. Under this definition,  $i \in s$  may have descendants in  $s[\Diamond\varphi]$  even if  $\{i\}[\Diamond\varphi] = \emptyset$ . A special clause for modal sentences would be one way to resolve this problem; another one would be to change the interpretation of modal sentences to a pointwise or “distributive” one with reference to modal accessibility relations. We would prefer the latter option for independent reasons, but we will not elaborate further in this paper. Here we restrict our attention to sentences without modal operators (except for the implicit modality in FCIs). The motivation for our definition will become clear below.

$$\text{b. } \exists x[S(x) \wedge W(x)]$$

In GSV’s account, the scope of the quantifier is processed in its entirety in one step during the interpretation of the existential quantifier. The definition is given in (31).

$$(31) \quad s[\exists x.\varphi] = \bigcup_{d \in D} (s[x/d][\varphi])$$

Although this definition is essentially static, the overall dynamic perspective of the framework invites a procedural, step-wise interpretation. From this point of view, it is natural to read it “inside out” as the following procedure:

- (32)    a.    For each  $d$  in the domain, do:  
               · introduce the referent  $x$  with assignment to  $d$ ;  
               · update the result with the scope of the indefinite;  
       b.    collect the results of (a.) by taking the union.

### 3.2 Indeterminates

In our analysis of Korean indeterminates, we follow the procedure in (32) in some respects, but make some important modifications. First, we define an operator ‘ $\mathcal{E}$ ’ whose interpretation stops short of taking the union of the states introduced during the interpretation of  $\exists$ :

$$(33) \quad s[\mathcal{E}x] = \{s[x/d] \mid d \in D\}$$

The result of this update is a set of “local” states, each of which corresponds to a particular individual to which  $x$  is assigned. There is an obvious connection between (33) and much of the recent literature on indefinites and indeterminates in other languages, such as Japanese (Kratzer and Shimoyama, 2002): The output is a *Hamblin*-set of states, indexed by individuals.

GSV proceed by updating each of these states with the entire scope of the quantifier (‘ $\varphi$ ’ in (31) above). As we will see, for our purposes it is advantageous to follow the linguistic structure more closely and split the sentence into the material that accompanies the indeterminate in its noun phrase on the one hand, and the rest of the sentence, on the other. In the case of (30-b), these parts are  $Sx$  and  $Wx$ , respectively; in the more general terminology of quantificational “tri-partite structures,” the two parts are the *restrictive clause* and *nuclear scope*. In our definitions, we will refer to them as ‘ $Px$ ’ and ‘ $Qx$ ’, respectively. We assume that the content of the restrictor  $P$  is typically richer than the overt material in the noun phrase. Specifically, aside from the lexical content of the indeterminate (“human” for both *nwukwu* and *amwu*), further information may be contributed by subtriggering and contextually given restrictions to salient domains.

Following GSV part of the way, we may update (33) with the restrictor to obtain the set of states in (34).<sup>4</sup>

$$(34) \quad s[\mathcal{E}x.Px] = \{s[x/d][Px] \mid d \in D\}$$

Now, this set of states may undergo various further operations. Updating with the nuclear scope and taking the union, as GSV do, is one possibility, and possibly the default in the absence of any particles (recall that *nwukwu* on its own is interpreted as an indefinite). In general, however,

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<sup>4</sup>This set of states can be taken to represent the listener’s belief state after a *specific* use of the indefinite: The listener knows that the speaker had some particular individual in mind, but does not know which individual that is. The analogy holds only for the special case of *rigid* specific reference. In the general case, the speaker’s referent may be an individual concept. See van Rooy (2001), Schwarzschild (2002) for more discussion.



particles may trigger different operations. The particle *-na* is a case in point.

### 3.3 The particle *-na*

The previous subsection introduced the interpretation of the combination of an indeterminate with the rest of the noun phrase. The particle *-na*, we claim, contributes universal quantification over the “local” states obtained in (33), leading to the assertion that the remainder of the sentence holds of all of them. For now, we write ‘ $Indet_x.P + na, Q$ ’ as an abstract representation of such sentences. This structure is then interpreted as a (dynamic) conditional as in (35-a), which receives the dynamic interpretation (35-b):

- (35) a.  $\llbracket Indet_x.P + na, Q \rrbracket = [(\mathcal{E}x.Px) \rightarrow Qx]$   
 b.  $s[(\exists x.Px) \rightarrow Qx] = \{i \in s \mid \text{for all } s' \in s[\mathcal{E}x.Px], \text{ if } i \text{ subsists in } s', \text{ then all descendants of } i \text{ in } s' \text{ subsist in } s'[Qx]\}$

This is the basic procedure at the center of the proposal. It is inspired by dynamic semantics, but we will now depart from that perspective in a couple of ways. First, due to the conditional form of the interpretation, the dynamic aspect is no longer essential, since no discourse referent introduced in the course of the update persists in its output. Thus nothing is lost if we reformulate the interpretation in a way that is (externally) static. Second, ultimately we want conditions of *truth*, not *belief*. Formally, that is, our interpretation will be spelled out relative to single possibilities, not sets thereof. Although modality will have to play a part, it does so in a way that does not collapse into truth as a result of the interpretation at a single possibility.

### 3.4 Truth conditions

To move from belief update to truth conditions at single possibilities, we take two steps: First, we replace our definitions in terms of *updates* with one in terms of *support*. The latter is a relation between sets of possibilities and sentences, defined by GSV in a standard way:

- (36)  $\llbracket \varphi \rrbracket_s = 1$  iff  $s[\varphi]$  exists and all  $i \in s$  subsist in  $s[\varphi]$ .

In our case, since the output of the update is a subset of the input state (i.e., no new discourse referents are activated), this comes down to the requirement that  $[\varphi]$  not add any new information to  $s$ , i.e.,  $s[\varphi] = s$ .

The second step is to replace the interpretation to sets of possibilities with one relative to individual possibilities. The simplest way to do this is to rephrase the above conditions in terms of the *singleton* sets of possibilities containing just the possibility  $i$  of evaluation.<sup>5</sup>

- (37)  $\llbracket Indet_x.P + na, Q \rrbracket_i = 1$  iff for all  $s' \in \{i\}[\mathcal{E}x.Px]$ ,  
 if  $i$  subsists in  $s'$ , then all of its descendants in  $s'$  subsist in  $s'[Qx]$

Notice that the truth conditions in (37) are equivalent to ordinary universal quantification. We turn next to the task of accounting for the difference between *nwukwu-na* and *amwu-na* in terms of intensionality and counterfactual implicatures.

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<sup>5</sup>If we assume that  $P$  does not contain any existential quantifiers, we can replace the reference to “all of its descendants” in (37) with “its descendant.”

### 3.5 Intensionality

Recall that *amwu-na* is in some sense “more intensional” than *nwukwu-na*, and that the former gives rise to stronger counterfactual implicatures than the latter. Since both involve the same particle, *-na*, the difference must be located in the lexical meanings of the indeterminates themselves. To account for the difference while keeping the meanings assigned to them maximally uniform, we propose that *nwukwu* and *amwu* differ in the role played by what we refer to as the property *P* in our formal definitions.

As we stated above, we take this property *P* to be an agglomerate of the indeterminates’ own descriptive content (“human” for both *nwukwu* and *amwu*), further lexical information found in the noun phrase (i.e., the noun that *amwu* combines with, as well as any subtriggering material), and possibly further implicit but contextually given content. The intensional flavor of *amwu* comes about, we believe, by quantification over *possible* individuals with property *P* in addition to *actual* ones. This proposal itself is not new (Eisner, 1995; Dayal, 1998; Chierchia, 2006). The question in the Korean case is how to spell out the difference between the indeterminates formally, given that both combine with *-na* in much the same way. *Amwu-na* presumably requires a more elaborate semantic treatment in terms of higher types than *nwukwu-na*, hence the former motivates the basic idea behind our proposal. To extend the same account to *nwukwu-na*, we then “generalize to the worst case,” giving it an interpretation whose intensionality is in effect inert.

The basic idea for sentences of the form *amwu<sub>x</sub>.P + na, Q* at a possibility *i* is this: In addition to universal quantification over all individuals in the extension of property *P* at *i*, the sentence also makes a claim about individuals that are not in the extension of *P* but *could be*. Formally, for those individuals, the interpretation depends not only on the facts at *i*, but in addition on those possibilities at which they *are* in the extension of *P*.

To implement this idea, we assume that the property *P* is intensional in the Montagovian sense, i.e., a function from possibilities to sets of individuals. In addition, we make the following two assumptions about *similarity* between alternative possibilities: For all  $s \subseteq I$ ,  $i \in s$ , and sentences  $\varphi$ :<sup>6</sup>

- (38) a. If *some* possibility subsists in  $s[\varphi]$ , then there is a set of *closest* descendants to *i* in  $s[\varphi]$ .
- b. If *i* subsists in  $s[\varphi]$ , then its descendants are the closest such possibilities in  $s[\varphi]$ .

These assumptions have an obvious connection to standard theories of counterfactual conditionals, specifically that of Stalnaker (1968) and Stalnaker and Thomason (1970). The existence of a set of closest descendants in (38-a) is not shared by all theories of counterfactuals (Lewis, 1973) but this assumption is harmless for our purposes and useful in the interest of simplicity. The “centering” assumption in (38-b) is more widely accepted (though not universally).

Given (38), we can make our basic assumption more precise: For those individuals which are not in the extension of *P* at *i*, if there are any possibilities at which they are, we look to the *closest* such possibilities.

To spell out this idea formally, we make two changes to the above definitions. First, we define the set of alternatives of *i* that are considered in the evaluation as those which differ from *i* at most in their world coordinate:

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<sup>6</sup>See van Rooy (this volume) for a discussion of how to derive the relevant set from an antecedently given Stalnaker-style preference order over possible worlds to account for the “indifference” implicature.

$$(39) \quad alt(\langle w, g \rangle) = \{ \langle w', g \rangle \mid w \in W \}$$

The second change is that we “take apart” the expression  $\mathcal{E}_x.Px$  and model its interpretation as a two-step procedure, first introducing the referent  $x$ , then evaluating  $Px$  with reference to similarity between possibilities.

$$(40) \quad \llbracket Indet_x.P + na, Q \rrbracket_i = 1 \text{ iff for all } s' \in alt(i)[\mathcal{E}_x.Px], \text{ if } s' \text{ is non-empty,} \\ \text{the closest possibilities to } i \text{ in } s' \text{ subsist in } s'[Qx]$$

In effect, (40) requires that for each individual  $d$  the Stalnaker/Lewis conditional  $Px > Qx$  (interpreted relative to a set selection function) be true. In line with Stalnaker’s theory of counterfactuals, this conditional comes down to the material conditional if  $d$  has property  $P$  at  $i$ , and it is vacuously true if there is no possibility at which  $d$  has property  $P$ . Thus universal quantification over the *actual* extension of  $P$  is entailed, and the reference to closest alternatives adds the corresponding counterfactual for those individuals that are not but *could be* in the extension of  $P$ .

Notice that we have not at this point imposed any constraints on the set  $alt(i)$ . This is almost certainly too liberal: For each individual  $d$ , as long as it is *logically possible* for  $d$  to have property  $P$ , there is a closest alternative at which it does and which therefore affects the truth of the sentence. In reality, there are likely to be limits on the possibilities speakers are prepared to entertain. Formally, such limitations can be modeled as restrictions on  $alt(i)$ . We will not explore this matter further here.

### 3.6 *amwu-nw* vs. *nwuku-na*

We are finally ready to turn to the difference between the two Korean FCIs. In the last subsection, we introduced the intensional element in the form of a Stalnaker-like conditional interpretation over possible individuals with property  $P$  in addition to actual ones. Based on the facts outlined in Section 2, this interpretation would seem most appropriate for *amwu-na*. To give an interpretation of *nwukwu-na* that is formally parallel, we cannot claim that the latter involves a quantificational device other than the Stalnaker conditional, since under our account this conditional element is contributed by the particle *-na*, which is shared between the two items.

Instead, we locate the difference in the role played by the property  $P$ , the restriction of the quantification. Specifically, we assume that *amwu* and *nwukwu* are lexically intensional and extensional, respectively, in the sense that the quantificational restrictor is  $P$  itself for *amwu*, but the extension of  $P$  for the latter. Formally, the restriction is of the same semantic type  $\langle s, \langle e, t \rangle \rangle$  in both cases. The difference is shown in (41): In (41-a),  $P$  is replaced for perspicuity with the equivalent expression  $\lambda j.Pj$  (where  $j$  is a variable ranging over possibilities). In (41-b), in contrast, we have  $\lambda j.Pi$ , the extension of  $P$ ’s intension at the index  $i$  of evaluation.

$$(41) \quad \begin{array}{ll} \text{a.} & \llbracket amwu_x.Px \rrbracket_i = [\mathcal{E}_x.[\lambda j.Pj]x] \\ \text{b.} & \llbracket nwukwu_x.Px \rrbracket_i = [\mathcal{E}_x.[\lambda j.Pi]x] \end{array}$$

Thus whereas the restriction of *amwu-na* may vary between alternative possibilities, that of *nwukwu-na* rigidly refers to the extension of  $P$  at  $i$ . The difference is shown graphically in Figure 1. Substituting (41-a) and (41-b) in the definition in (40) above, we obtain the interpretation in (42-a) and (42-b) for *amwu-na* and *nwukwu-na*, respectively.<sup>7</sup>

<sup>7</sup>If we assume that for each  $d \in D$ , there is a unique closest possibility to  $i$  in which  $d$  has property  $P$ , we can

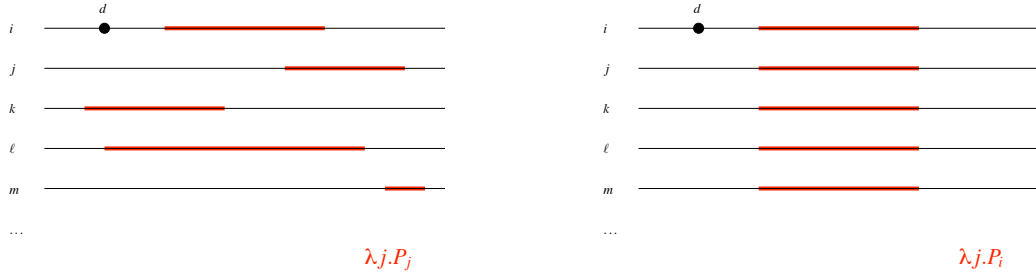


Figure 1: Restriction  $P$  for *amwu-na* (left) and *nwukwu-na* (right) at alternative indices from the perspective of  $i$ . For individual  $d$  not in  $P_i$ , there are alternative indices in which  $d$  is in the extension of  $\lambda.j.P_j$ , but none in which it is in the extension of  $\lambda.j.P_i$ .

- (42) a.  $\llbracket amwu_x.P + na, Q \rrbracket_i = 1$  iff for all  $s' \in alt(i)[\mathcal{E}_x.[\lambda.j.P_j]x]$ , if  $s'$  is non-empty, the closest possibilities to  $i$  in  $s'$  subsist in  $s'[Qx]$
- b.  $\llbracket nwukwu_x.P + na, Q \rrbracket_i = 1$  iff for all  $s' \in alt(i)[\mathcal{E}_x.[\lambda.j.P_i]x]$ , if  $s'$  is non-empty, the closest possibilities to  $i$  in  $s'$  subsist in  $s'[Qx]$

The crucial difference between these two rules lies in their treatment of individuals which are not in the extension of  $P$  at the index  $i$  of evaluation: In the case of *amwu-na*, the set  $alt(i)[\mathcal{E}_x.[\lambda.j.P_j](x)]$  will contain possibilities in which  $d$  has property  $P$ , as long as there are any such possibilities. As a result, the truth of the sentence requires that  $d$  have property  $Q$  in the closest such alternative. In contrast, alternative possibilities do not play a role in the truth conditions for *nwukwu-na*: If  $d$  is not in the extension of  $P$  at  $i$ , then it is not in the extension of  $\lambda.j.P_i$  at any other possibility either. Thus the presence of the counterfactual implicature that if  $d$  had property  $P$ , it would have property  $Q$ , is predicted for *amwu-na* but not for *nwukwu-na*. However, universal quantification over all individuals which have property  $P$  at  $i$  is predicted for both items.

### 3.7 Back to uncertainty

In the preceding subsections, we have developed a definition of the truth conditions of sentences involving *amwu-na* and *nwukwu-na* with respect to individual possibilities. Relative to a possibility  $i$ , the relevant facts, in particular the extensions of the predicates  $P$  and  $Q$ , are fully determined. In practice, it is of course not the case that the use of either *amwu-na* or *nwukwu-na* presupposes that the extension of these predicates be *known*. The last step in our analysis will therefore be the generalization from an interpretation relative to single possibilities to one relative to non-singleton information states. Given an information state  $s$ , the interpretation proceeds “pointwise” at the individual possibilities in  $s$  according to the rules given above. The sentence is then true in  $s$  if and only if it is true in all possibilities in  $s$ :

- (43)  $\llbracket Indet_x.P + na, Q \rrbracket_s = 1$  iff for all  $i \in s$ ,  $s' \in \llbracket Indet_x.P \rrbracket_i$ , if  $s'$  is non-empty, the closest possibilities to  $i$  in  $s'$  subsist in  $s'[Qx]$

One important feature of the interpretation rule in (43) is that it introduces the possibility of a certain “mild” form of counterfactuality in the interpretation of *nwukwu-na*. As we briefly noted in Section 2 with regard to (19) and (20), repeated here as (44) and (45), the claim that *nwukwu-na* never introduces a counterfactual implicature would be too strong: (44) *can* be

refer to the single closest possibility to  $i$  in of the local Hamblin states  $s'$ .

understood as implicating that if more people had been available for John to go out with, he would have gone with those as well.

- (44) John-un *nwukwu-na* sakwi-ess-ta.  
 J.-Top Indet-NA date-Pst-Decl  
 John went out with anybody (available).
- (45) John-un *amwu-na* sakwi-ess-ta.  
 J.-Top Indet-NA date-Pst-Decl  
 John went out with anybody (available).

At the same time, this counterfactual implicature of *nwukwu-na* is felt by most native speakers to be somehow “weaker” than the one carried by *amwu-na* as in (45). The judgments in this area are a bit murky and more work is required before a precise characterization of the difference will be possible with any confidence. Meanwhile, we should point out that our account predicts a “weak” counterfactual implication for episodic *nwukwu-na* with past reference which may turn out to be of just the right kind.

The counterfactuality we have in mind arises when the development of epistemic states over time is taken into account. In (44), at the relevant time in the past, John may have resolved to go out with all the people who are available, without however knowing who those people are. This reading arises from the combination of the purely extensional interpretation of *nwukwu-na* with uncertainty about the extension of the relevant restriction. With hindsight, it may turn out that some of the people of whom John thought that they might be available, were in fact not. Still, it remains true that John would have met them if they had been available. In other words, the fact that there are some individuals *d* of whom the indicative conditional in (46) was true (relative to John’s belief state) at the relevant past time is responsible for the “mild” counterfactuality of (44). In contrast, the use of *amwu-na* in (45) indicates that the counterfactual (46-b) was true at the relevant past time of some individuals *d* of whom John never thought that they were available.

- (46) a. If *d* is available, John will go out with *d*.  
 b. If *d* were available, John would go out with *d*.

### 3.8 Further notable consequences

The analysis we have offered above can account for some additional facts which we discussed in Section 2. Due to space limitations, we can only briefly outline those predictions in this subsection.

Recall that *nwukwu* is used without a particle as an indefinite or interrogative pronoun, meaning ‘someone’ or ‘who’, respectively. As we noted in Section 3.2 above, we assume that *nwukwu* on its own only activates a fresh discourse referent and that the existential import on its use as an indefinite is the result of a default operation on the “Hamblin sets” that result from this activation. In contrast, *amwu* has no such use and must instead be combined with particles like *-na* or *-to* (see Footnote 1) to receive an FCI or NPI reading. The inherent intensionality which we attribute to *amwu* explains its suitability for the latter uses as well as the fact that it cannot be used on its own as an indefinite in the way *nwukwu* can.

To see this, consider how we might model the update with *amwu* alone, outside of the construction with *-na*. Following the basic idea behind the definitions in (40) and (41) above, but modifying them somewhat for present purposes, we might propose some version of the follow-

ing. For each  $i \in I$  and sentence  $\varphi$ , let  $f(i, [\varphi])$  be the set of closest possibilities to  $i$  in  $alt(i)[\varphi]$ . The result of introducing a discourse referent with *amwu* and *nwukwu* would then be (47-a) and (47-b), respectively. (Again, we use ‘ $P$ ’ to stand for the relevant restriction, at least ‘human’ in both cases, but possibly richer than that.)

- (47) a.  $\{i\}[amwu_x.P] = \{f(i, [x/d][\lambda j.P_jx])|d \in D\}$   
 b.  $\{i\}[nwukwu_x.P] = \{f(i, [x/d][\lambda j.P_ix])|d \in D\}$

Taking the union of these outputs as part of the default existential closure associated with the use as an indefinite, the final result for *nwukwu* is a state which contains only descendants of  $i$ , whereas that for *nwukwu* will be invaded by counterfactual possibilities. This is clearly an undesirable result, unless it occurs in the context of a larger construction in which these counterfactual possibilities are put to some meaningful use, as is the case with the particles *-na* and *-to*. This explains why *amwu*, unlike *nwukwu*, is not used as in indefinite with existential closure.

In construction with particles which contribute a non-existential quantificational force, however, the intensionality of *amwu* makes an essential contribution. NPIs and FCIs are generally and cross-linguistically associated with domain widening and quantification over non-actual individuals (Kadmon and Landman, 1993; Eisner, 1995; Krifka, 1995; Chierchia, 2006; van Rooy, 2003). Thus under account, the FCI reading of *amwu-na* comes about through the interplay between the meanings of *amwu* and *-na*, but cannot be attributed to either alone: *Amwu* lacks the quantificational force, and *-na* on its own does not induce quantification over non-actual individuals, as witnessed by the fact that it does not do so when combined with *nwukwu*.

In a similar way, our proposal can account for the strong scalar implicature, in the sense of quantification over marginal or unlikely individuals, that is observed with *amwu* but not with *nwukwu*. In principle, quantification over marginal individuals is similar to quantification over non-actual ones. To account for its absence in the case of *nwukwu-na*, we assume that the domain of quantification is typically restricted to a set of salient or typical individuals. For our present purposes, this restriction can be taken to be part of the property  $P$ . In contrast to *nwukwu-na*, *amwu-na* then ranges over individuals that are not but could be included in this domain.

#### 4 Conclusion and future work

We have offered an account of some of the salient differences between *nwukwu-na* and *amwu-na*. However, a number of the facts we described in Section 2 are not accounted for by the version presented here. For instance, the fact that unlike *nwukwu-na*, *amwu-na* does not always appear to have universal quantificational force seems to be at odds with our account of *-na*. It is debatable, however, whether this mismatch should be addressed by the semantic analysis. A similar variability in quantificational force in the English FCI *any* has been at the center of much discussion in the literature. In this debate, (Dayal, 2005) has argued forcefully that apparently existential instances of *any* are due to pragmatic factors. We subscribe to this general view for the time being, recognizing that more work will be required to settle the issue.

Another open issue on which more work is required, specifically with regard to the Korean data, concerns the restrictions on the kinds of contexts which license the occurrence of *amwu-na*. As we noted above, intensionality is a necessary requirement, but not all intensional contexts make *amwu-na* felicitous. In particular, further work on the exact nature and formal analysis of volitionality is required in order to account for the restrictions on *amwu-na* in object position.



Finally, our formal analysis stipulates that *-na* induces a universal quantificational force, but we made no attempt to reconcile this fact with the disjunctive basic meaning of the particle. Universal readings of disjunctive expressions are pervasive and pose intriguing puzzles in themselves; however, our take on this phenomenon in the case of Korean *-na* will be the subject of another contribution.

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