

**Numeral *Any*: In Favor of Viability**  
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**[Introduction]** Without modification, *any* is ungrammatical under necessity modals, (1a), but licensed under possibility modals, (1b), or downward-entailing operators, (1c). Like other Universal Free Choice Items (FCIs), with a possibility modal, *any* makes a universal claim: (1b) conveys that *every* card is a possibility. In (1c), however, *any* can be paraphrased with a narrow scope existential: (1c) excludes J. having picked a card. When *any* combines with a numeral, its distribution and interpretation differs: ‘numeral *any*’ is licensed with necessity modals, (2) [D04]. In this case, it behaves like an Existential FCI: (2) conveys that J. is required to pick *a* (not *every*) pair of cards (and that every pair is permitted).

- (1) a. \*J. must pick any card. c. J. didn’t pick any card.  
b. J. may pick any card. (2) J. must pick any two cards.

[Ch13] and [D13] resolve the tension between the existential and universal components of *any* by assuming that *any* is uniformly an existential that can be strengthened by excluding alternatives, but derive (1-2) differently. We zoom in on numeral *any*, and present evidence, based on the behavior of numeral *any* with collective predicates, supporting [D13] over [Ch13].

**[Numeral *Any*: Two Accounts]** [Ch13] analyzes *any* as an existential (represented below with a disjunction). When the domain of cards is  $\{a, b\}$ , (3a) asserts (3-b). (3-b) determines a set of domain alternatives by restricting the domain of quantification to every possible non-empty subset (i.e.  $\{a\}, \{b\}$ ). Each domain alternative is strengthened by innocently excluding the others to derive a set of ‘pre-exhaustified’ domain alternatives, (3c). *Any* also triggers a scalar alternative, (3d). A covert exhaustifier ( $O_{ALT}$ ) strengthens (3b) with the negation of any non entailed alternative. The alternatives in (3-c,d) are all stronger than (3b) and are, therefore, excluded. The assertion, together with the exclusion of the pre-exhaustified domain alternatives, (3e), entails (3d), and so,  $O_{ALT}$  derives a contradiction. This rules out (3a).

- (3) a. \*J. picked any card. b.  $P(a) \vee P(b)$  c.  $\{P(a) \wedge \neg P(b), P(b) \wedge \neg P(a)\}$  d.  $P(a) \wedge P(b)$  e.  $P(a) \leftrightarrow P(b)$

[Ch13] assumes a wide scope constraint (WSC) that forces *any* to outscope modals. This derives a contradiction for (1a) and (1b), parallel to (3). To account for the different status of (1a-b), the context dependent nature of modals is exploited: an interpretation constraint (‘Modal Containment’, MC) requires the modal base for the scalar alternative to be a proper subset of the modal base for the negation of the pre-exhaustified domain alternatives. In (1b), the assertion plus negated pre-exhaustified alternatives conveys (4-a). Together with MC, the scalar implicature, in (4-b), requires that in  $D'$ , a proper subset of  $D$ , J. be not permitted to pick one of the cards. (4a) and (4b) are consistent (they are satisfied, for instance, in the scenario in (6) when  $D = \{w_1, w_2\}$  and  $D' = \{w_1\}$  or  $D' = \{w_2\}$ ). The MC does not help with (1a) though, since the assertion plus negation of the pre-exhaustified domain alternatives (5-a) entails the scalar alternative (5-b) for any  $D' \subseteq D$ .

- (4) a.  $\diamond_D P(a) \wedge \diamond_D P(b)$  b.  $\neg(\diamond_{D'} P(a) \wedge \diamond_{D'} P(b))$  (5) a.  $\square_D P(a) \wedge \square_D P(b)$  b.  $\square_{D'} P(a) \wedge \square_{D'} P(b)$

- (6) Permitted worlds:  $w_1$  : J. picks a and no other card,  $w_2$  : J. picks b and no other card.

To explain (1a) vs. (2), the WSC is overridden in (2). Numeral *any* also invokes pre-exhaustified domain alternatives and scalar alternatives (determined by considering higher numerals). When  $D = \{a \oplus b, b \oplus c, a \oplus c, a \oplus b \oplus c\}$  (where ‘ $a \oplus b$ ’ denotes the plurality consisting of books *a* and *b*), (2) asserts (7-a) (it conveys that J. must pick at least one group of *exactly* two cards) and triggers the scalar alternatives that J. is required to pick at least one group of *n* cards, for any  $n > 2$ , (7-b). With distributive predicates, the assertion, strengthened by excluding the pre-exhaustified alternatives, (7c), conveys that for every card *x*, J. is required to pick *x*, (7d). Any higher numeral would also convey (7d) (and also derive a contradiction with the negated scalar alternative). This motivates a SCALE ECONOMY CONDITION (SEC), (8), which blocks the wide scope construal of numeral *any* whenever the meaning of all the scalar alternatives are equivalent.

- (7) a.  $\Box P(a \oplus b) \vee \Box P(b \oplus c) \vee \Box P(a \oplus c)$  b.  $\Box P(a \oplus b \oplus c)$  c.  $\Box P(a \oplus b) \leftrightarrow \Box P(b \oplus c) \leftrightarrow \Box P(a \oplus c)$   
 d.  $\Box P(a) \wedge \Box P(b) \wedge \Box P(c)$  (because  $P$  is distributive.)

- (8) \*[O FCI<sub>i</sub> ... ], if FCI<sub>i</sub> ∈ {FCI<sub>1</sub>, ... FCI<sub>n</sub>} (n > 2) and for all j (1 ≤ j ≤ n) [[O FCI<sub>i</sub> ... ]]= [[O FCI<sub>j</sub> ... ]]

The SEC is satisfied when numeral *any* scopes under the modal. In that case, the assertion plus the negation of the pre-exhaustified domain alternatives (9-a) is compatible with the negation of the scalar alternatives: (9) is satisfied in models like (9-b), where J. cannot pick more than two cards. Higher numerals would convey that J. is required to pick more cards, and are then not equivalent.

- (9) a.  $\Box P(a \oplus b) \leftrightarrow \Box P(a \oplus c) \leftrightarrow \Box P(b \oplus c)$  b.  $w_1: P(a \oplus b) \wedge \neg P(c), w_2: P(a \oplus c) \wedge \neg P(b), w_3: P(b \oplus c) \wedge \neg P(a)$

[D13] also treats *any* as an existential that triggers and excludes pre-exhaustified domain alternatives, but a single ‘Viability Constraint’ (VC) replaces the WSC, the MC, and the SEC. The VC requires each pre-exhaustified domain alternative to be true in some world in a set (the domain of modals or, in episodic environments and under modals, the singleton containing the world of evaluation). The VC is evaluated at the smallest constituent containing *any*. Because the pre-exhaustified domain alternatives are mutually incompatible, the VC is violated in (3a) and when *any* scopes under modals (since there the VC domain is a singleton). When *any* outscopes a necessity modal, the assertion, strengthened by excluding the pre-exhaustified alternatives, conveys, again, (5a). If (5a) is true, all non-exhaustified domain alternatives are true in all accessible worlds, and the VC is not satisfied. When *any* outscopes a possibility modal, the VC can be satisfied in models like (6), where each pre-exhaustified alternative is true in some world (e.g.  $\Diamond_{D'} P(a) \wedge \neg \Diamond_{D'} P(b)$  is when  $D' = \{w_1\}$ ). Unlike *any*, numeral *any* introduces two existentials, (10a): one corresponding to the numeral, and the other to *any* (which scopes under the modal). For numeral *any*, the VC is checked at the smallest constituent containing the numeral, above the modal. (10a) asserts (10b). For distributive predicates, (10b) is equivalent to (9a), which is true in models like (9b), where the VC is satisfied (e.g.  $\Box_{D'} P(a \oplus b) \wedge \neg \Box_{D'} P(b \oplus c) \wedge \neg \Box_{D'} P(a \oplus c)$  when  $D' = \{w_1\}$ ).

- (10) a. two  $\lambda_d [\Box [ [\text{any } t_d\text{-many cards}] \lambda_1 [J. \text{ pick } t_1]]]$  b.  $\lambda w. \exists n [n = 2 \wedge \Box_{w'} [\exists x [C_w(x) \wedge |x| = n \wedge P_{w'}(J, x)]]]$

[Collective Predicates] While both [Ch13] and [D13] cover the contrasts in (1-2), these two analyses make different predictions when numeral *any* combines with collective predicates.

For [Ch13], a wide scope construal of numeral *any* with a collective predicate, like *mix*, (11a), (i) satisfies the SEC, and (ii) leads to a universal claim, rather than a contradiction. (11a) is predicted to convey (i) that J. is required to mix all pairs of drinks—this is what the assertion, in (12a), together with the exclusion of the pre-exhaustified alternatives (12b) conveys—and (ii) that he is not required to mix a larger group of drinks—this is what the exclusion of the scalar alternative(s), (12c), conveys. The counterpart of (11a) with *any three* is predicted to convey that J. is required to mix all groups of three drinks and that there is no larger group of drinks that he is required to mix. Since this is a different meaning, the SEC is not violated, and numeral *any* should not be forced to scope under the modal.

- (11) a. J. must mix any two drinks. b. Bar tender contest. There is coke, whiskey, and gin. J. is required to mix coke and whiskey, coke and gin, and whiskey and gin. c. Same drinks. J. is permitted to mix any couple of drinks. He is required to mix at least one pair, but not required to mix any particular pair.

- (12) a.  $\Box M(a \oplus b) \vee \Box M(b \oplus c) \vee \Box M(a \oplus c)$  b.  $\Box M(a \oplus b) \leftrightarrow \Box M(b \oplus c) \leftrightarrow \Box M(a \oplus c)$  c.  $\neg \Box M(a \oplus b \oplus c)$

[D13] predicts (11a) to assert (13a). As for [Ch13], the strengthened assertion will be true both in (11b) and (11c): the predicted interpretation will be true when all terms of the biconditional are false (11c) and when they are all true (11b). However, VC blocks the second possibility.

- (13) a.  $\Box [M(a \oplus b) \vee M(b \oplus c) \vee M(a \oplus c)]$  b.  $\Box M(a \oplus b) \leftrightarrow \Box M(b \oplus c) \leftrightarrow \Box M(a \oplus c)$  c.  $\neg \Box M(a \oplus b \oplus c)$

The wide scope interpretation that [Ch13] predicts is true in (11b), but false in (11c). The interpretation that [D13] predicts is true in (11c), but false in (11b). Our informants side with [D13], rather than [Ch13], confirming the unavailability of a universal reading in contexts like (11). Note that these judgements would also disconfirm the predictions of [Ch13] if the WSC were taken to be a violable constraint. In that case,

numeral *any* could also have a narrow scope interpretation, and (11a) could also assert (13a). The negation of the pre-exhaustified domain alternatives (13b), together with (13a), and the negation of the scalar alternative (13c), would predict (11a) to be true both in (11b) and (11c).

**References.** [CH13] Chierchia, G. (2013). *Logic in grammar: Polarity, free choice, and intervention*. OUP Oxford. — [D13] Dayal, V. (2013). A viability constraint on alternatives for free choice. In *Alternatives in semantics* (pp. 88-122). Palgrave Macmillan, London — [D04] Dayal, V. (2004). The universal force of free choice. *Linguistic variation yearbook*, 4(1), 5-40.