Uniform Dimensionality across the board: *many* oranges & morpho-syntactic opacity.

1.Introduction. *much* and *many* are Q(uantity)-morphemes that introduce a measure function μ. According to **Uniform Dimensionality (UD)** (Hackl 2000; Solt 2009, 2015; Wellwood 2018), *much* is underspecified for the dimension of measurement while *many* can only denote CARD(inality): *much coffee* = [VOL(ume)], *much furniture* = [CARD] vs. *many coffees* = [CARD, *VOL]. However, Snyder (2021) has recently challenged **UD** arguing, based on data like (1), that *many* like *much* can associate with different dimensions of measurement. We call this alternative **Multiform Dimensionality (MD)**. Snyder does not report any variation, but we have found based on data from 12 speakers of American English that not everyone accepts the VOL interepretation; hence the %.

(1) *[Making punch. Mary squeezes 5 normal sized oranges pouring the pulp into her punch. John does the same with 10 small oranges, exactly half the size of Mary's.]*
Mary put as many oranges in the punch as John [#CARD., %VOL.]

In addition to reviewing the English data, we present data from Italian & Spanish, and **argue that we must not abandon UD. In fact, *many* cross-linguistically measures cardinalities, and when it seems like it does not, this is due to morpho-syntactic opacity**: whether plural has the expected semantic effect depends on whether it is in the scope of MUCH.

2.Many = VOL. Snyder claims that, like container nouns (e.g. *glass*), plural count nouns like *oranges* are ambiguous between an individuating (CARD) and a measuring (VOL) interpretation, and reports that when combined with *many*, the ambiguity still holds. Snyder takes equatives (1) and answers to *how many* questions (2) as evidence for **MD**. However, *that many* in (3) cannot anaphorically reference VOL, only CARD. Although Snyder (2021, 541) claims (3) is not a problem if we "abandon the assumption that measure contexts always induce measure interpretations", such a move undermines the proposal, given that the main motivation is this alleged ambiguity.

(2) *[John knows that Mary needs 5lbs of orange pulp, but she is unsure if John has purchased enough oranges.]* Mary: How many oranges did you buy? John: {5 oranges/ %5lbs.}

(3) *[John and Mary both begin with 5 oranges, though her oranges are exactly half the size of his. They pulverize their oranges, pouring the resulting orange pulp into their punches.]*
John: I put 5 oranges in my punch. Mary: I put that many oranges too. [CARD., *VOL]

3.Spanish & Italian. The Q-morpheme *tant-* "much" agrees in ϕ with the NP. The *much-many* distinction is marked by plural agreement (cp. suppletion in English). For the VOL interpretation, *tant-* must be univocally singular; if plural, it is only CARD: (4) and (5). Neither equatives (6) nor anaphoric *that many* (7) can denote VOL. In fact, *tant-*PL is equivalent to *that number*, but not to *that amount*. Only a *how many* question in a context like (2) can be answered in terms of VOL (8).

(4) tant-a naranja *(SP)*
tant-a arancia *(IT)*
much-F orange.F
'(as) much orange [*CARD., VOL]

(5) tant-as naranja-s *(SP)*
tant-e arance *(IT)*
much-F.PL orange.F.PL
'(as) much orange [CARD., *VOL]

(6) a. María ha puesto tant-as naranjas como Juan *(SP)*
Maria has put much-F.PL orange.F.PL as John

b. Maria ha messo tant-e arance quante Gianni *(IT)*
Maria has put much-F.PL orange.F.PL how.much John
'María has put as many oranges as Juan has [CARD., *VOL]'

(7) *[María (a Juan)]*: he puesto { tant-as/ ese número/ *esa cantidad}. *(SP)*
[Maria (a Gianni)]: Ho messo { tant-e/ quel numero/ *quella quantità} *(IT)*
Maria to John have.I put much-F.PL that number that amount =(3)

(8) Maria: cuánt-as naranjas has comprado? Juan: { 5 naranjas/ 5lb} *(SP)*
Maria: quant-e arance hai comprato Gianni: { 5 arance/ 5lb} *(IT)*
Maria how.much-F.PL orange.F.PL have bought? John 5 orange.F.PL 5lb *=(2)*

4.MD does not hold. None of Snyder's (2021) crucial diagnostics pass in Spanish & Italian, which indicates that **MD** does not hold cross-linguistically. As to questions – the only test that passes in all three languages –, VOL can be due to independent issues of the semantics-pragmatics of questions (Groenendijk and Stokhof 1984; Simons 2000; Abrusán 2011): questions need not require a direct answer. An answer to (2) & (8) is felicitous only if John's buying a particular volume of oranges contextually entails him buying a particular number of oranges. As a result, we take the Romance and (inconclusive) English data as evidence for debunking **MD**.

5.*many* = *much*+PL. We propose that MUCH (9) can be merged in two different syntactic positions in the nominal domain: Spec,NP (10), and Spec,NumP (11). The underspecified μ is resolved by the syntactic context: if MUCH scopes over "portions of stuff", then we get a dense measure function, e.g. VOL (10). But, if MUCH scopes over pluralities, then we get CARD (11).

(9) $[\![\text{MUCH/TANT-}]\!] = \lambda d.\lambda\alpha.\mu(\alpha) \geq d$

(10) $[_{\text{NumP}}\ \text{Num}_{[u\text{Num:PL}]}\ [_{\text{PL}}\ [_{\text{IND}}\ [_{\text{NP}}\ \mathbf{[_{DegP}\ MUCH]}\ [_{\text{N'}}\ \textit{orange}_{[i\text{Num:PL}]}]]]]]$ *(Low DegP:* VOL*)*

(11) $[_{\text{NumP}}\ \mathbf{[_{DegP}\ MUCH]}\ [_{\text{Num'}}\ \text{Num}_{[u\text{Num:PL}]}\ [_{\text{PL}}\ [_{\text{IND}}\ [_{\text{NP}}\ \textit{orange}_{[i\text{Num:PL}]}]]]]]$ *(High DegP:* CARD*)*

Following Sauerland (2003), Scontras (2013), and Alexiadou (2019) a.o., we divorce morpho-syntactic number ($\text{Num}_{[u\text{Num:PL}]}$) from semantic number (PL): the former is in charge of $Agree(Num, NP)$ and is semantically uninterpretable; the latter applies to a set of atoms and returns those atoms and their sums (cf. Link 1983). The NP $[\![orange]\!]$ is a property of portions of orange-stuff. IND maps $[\![orange]\!]$ to a property of atomic entities (12) (Wellwood 2018, 2019), which [PL] then maps to a property of pluralities: (13), where xx is a plural variable and $xx(x)$ means that x is an atom of xx.

(12) $[\![\text{IND}]\!] = \lambda P_{\langle et\rangle} : Anti-at(P).\lambda y : Atom(y)\exists x(P(x) \wedge y \rhd x)$

(13) $[\![\text{PL}]\!] = \lambda P_{\langle et\rangle} : Atomic(P)\lambda xx.\forall x(xx(x) \rightarrow P(x))$

The denotation of the low [[DegP NP]] before number semantics enters the derivation is in (14). On the contrary, when DegP is in Spec,NumP (15) obtains.

(14) $[\![\text{MUCH } orange]\!] = \lambda x.\mu_{\text{VOL}}(x) \geq d \wedge orange(x)$

(15) $[\![\text{MUCH PL IND } orange]\!] = \lambda xx.\mu_{\text{CARD}}(xx) \geq d \wedge \forall y : Atom(y)[xx(y) \rightarrow \exists x[orange(x) \wedge y \rhd x]]$

At PF, we need two different Vocabulary Insertion rules: (16). English examples like (17) in which the Vocabulary Insertion rule in (16a) has not applied support the low merger of MUCH in (10).

(16) a. $\text{MUCH} \rightarrow \textit{many}/\_\_]\ \text{NP}_{[i\text{Num:PL}]}]$ (*Low DegP* = VOL)
b. $\text{MUCH} \rightarrow \textit{many}\ /\ \_\_]\ \text{NumP}_{[u\text{Num:PL}]}]$ (*High DegP* = CARD)

(17) %If you come by the farm, you can pick up as much oranges as you want. [*CARD, VOL]

In Spanish and Italian, given that *tant*-PL only denotes CARD, and sentences like (17) are ungrammatical, only the high merger site of the DegP is compatible with plural NPs.

6.Outlook. The proposal predicts that there can be languages that make a morpho-syntactic distinction in the degree morpheme introducing μ depending on what is being quantified over. This is borne out in the Norwegian comparative morpheme (Bhatt and Homer 2019): *mer(e)* is used to compare mass NPs, whereas *flere* is only compatible with plural count NPs.

7.Conclusion. We have shown that *many* cross-linguistically measures cardinalities, and when it does not, this is due to morpho-syntactic opacity: MUCH measures anti-atomic entities before number semantics and number morphology enter the derivation. This proposal ultimately allows for Snyder's type grammars, while maintainig **UD** as a robust universal.