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The superiority of a movement approach to Greenberg's Universal 20 (a reply to Dryer 2018)

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This article is a reply to Matthew Dryer's critique (2018, "On the order of demonstrative, numeral, adjective, and noun," *Language* 94.4.798–833) of the derivation of Joseph Greenberg's Universal 20 (1963, "Some universals of grammar with particular reference to the order of meaningful elements") that I proposed in 2005 ("Deriving Greenberg's Universal 20 and its exceptions," *Linguistic Inquiry* 36.3.315–332). My claim is that Dryer's approach compares unfavorably with the movement approach I advocated then (and in subsequent work). Dryer's iconic principles are tailored to apply just to the nominal elements demonstrative, numeral, adjective, and noun (not to mention the fact that they essentially restate the facts that they are intended to explain). In particular the iconic principles cannot carry over to the order of other elements displaying the exact same pattern in the nominal and clausal domains. One would have to contrive distinct iconic principles for each such domain. The movement approach I have suggested instead generalizes to all such domains naturally, as the very same movement options are involved. The appendix to this article considers the putative counter-examples mentioned by Dryer, arguing that on closer inspection they prove to be either spurious or far from constituting clear counter-evidence.

Keywords: Universal 20; word order; order of adjectives



1 Introduction

In Cinque 2005 it was claimed that of the 24 mathematically possible orders of the four elements demonstrative, numeral, adjective, and noun (Dem, Num, A, N; the number of possible orders is the factorial of four = 24), only 14 are attested in the languages of the world and that the actually attested orders—and none of the unattested ones—can be derived from the single underlying hierarchy/order $\text{Dem} > \text{Num} > \text{A} > \text{N}$ through movement of just the noun (yielding the orders Dem Num N A , Dem N Num A , and N Dem Num A) or of the noun within larger phrases (yielding the remaining 11 attested orders).¹ A secondary point was to report for each of the attested orders the rough number of languages that instantiate it (fewer and fewer the more marked options are involved in the derivation of it).

Dryer 2018, a critique of that analysis, claims that its system of iconic principles fares better than a movement analysis in accounting for the cross-linguistically attested orders of Dem, Num, A, and N and their relative numerosity; Dryer also claims that four orders that the account in Cinque 2005 excluded are actually attested in his sample, if only by a few languages.

In this paper I primarily compare the theoretical account offered in Cinque 2005 (and Cinque 2023) with Dryer 2018's, suggesting that a movement-based approach, where what can move is just the Head (or the Head within a larger constituent that includes its modifiers; for the representation *Head* as opposed to *head* see Cinque 2023: 11–12), is superior to the principles discussed in Dryer 2018 as it can express in a unified manner the same word order pattern found in various nominal and clausal domains, something that Dryer's system of iconic principles, restricted to the order of Dem, Num, Adj, and N, appears to be unable to capture unitarily.

¹ See (17) in section 2.1. Cinque 2005 aimed at deriving Greenberg 1963's Universal 20 and its exceptions by movement limited to the Head of the nominal extended projection, NP, in one of the possible ways XPs can move (by themselves or with pied piping of the *whose pictures* or *pictures of whom* types). To obtain the attested canonical orders of the noun phrase across languages, Dem, Num, and A must not be able to move by themselves. Otherwise non-attested canonical orders could be derived, like A Dem Num N . These modifiers can (irrelevantly) move, in some languages, for focus or other information- or scope-related purposes, typically alongside the canonical order. See for example the case of Bangla (Syed 2014) and the Chinese special order A Dem Num N alongside the canonical order Dem Num A N (Zhang 2015). Cinque 2023 contains a refinement of Cinque 2005's analysis (whereby even the order Dem Num A N involves movement, for reasons discussed there), but this is not crucial for the purposes of the present arguments. For a partial alternative see Abels & Neeleman 2012.

Here, I keep to the traditional terms *demonstrative*, (*cardinal*) *numeral*, and *adjective* despite the apparent variation in morphosyntactic category with which each such modifier may be expressed in different languages. So, demonstratives may take the morphological form of adjectives (as, e.g., in Italian or Serbian), of locative adverbs (as, e.g., in the Kru language Guébie—Hannah Sande, personal communication), or of invariable particles (as, e.g., in Korean). Cardinal numerals may have the morphological form of adjectives (as, e.g., in Ladin, where lower numerals show gender agreement), or they may be expressed by a prepositional phrase (as, e.g., in the Papuan language Digul Wambon: *ap hitulop-kup* ‘four houses’—lit. house index.finger-with—De Vries 2014: 333), or by a relative clause such as ‘that are two’ (as in the Oceanic language Natqgu—Boerger 2022: 9). Similarly for “adjectives,” as the different morphosyntactic forms in which they appear in different languages can be taken to correspond to the same abstract modifier type, merged in all languages at a specific point in the extended nominal projection (this also seems to be the position taken in Dryer 2018: sect. 4.2). The question may turn out to be otiose if one accepts the persuasive evidence in Kayne 2006 of the presence of silent categories accompanying the overt ones, to the effect that not only do color adjectives (for example) modify a color noun but also cardinal numerals are necessarily part of a nominal phrase headed by the silent noun ‘number’ (which is overt in certain languages—see the case of the Naduhup language Hupda: *kag-ʔap čāt* ‘two horns,’ lit. two-number horns, in Moore & Franklin 1977: sect. 4.3.1), this phrase being what modifies the (overt) main noun. What may be universal is the invariant position that each type of modifier (whatever morphosyntactic form it takes) occupies in the structure of the extended nominal projection.

In the appendix (see supplementary material) I address the putative counter-examples to Cinque 2005 mentioned by Dryer, arguing that on closer inspection they prove to be either only apparent or far from constituting clear counter-evidence, as the seemingly problematic orders are not the only orders possible in those languages. A larger sample, of over 2,200 languages, which I collected over the last several years, seems in fact to confirm the basic generalizations suggested in Cinque 2005 concerning the *possible* and *impossible* canonical orders of Dem, Num, A, and N across languages.²

² This enlarged sample of 2,281 languages (https://www.academia.edu/143157989/Universal_20_sample_Guglielmo_Cinque_2025; a previous sample of 1,687 languages is also available on the Terraling website: <https://terraling.com/groups/15>) is still a sample of convenience, determined by the grammatical descriptions that happened to be available to me. Nonetheless, the methodology of Dryer 1992 and Dryer 2018, followed here, where genera rather than

2 A comparison of the approach of Cinque 2005 and Cinque 2023 and that of Dryer 2018

2.1 Evidence that movement is at the basis of word order variation

In addition to the evidence discussed in Kayne 2005, Kayne 2022, Kayne 2023,³ and Kayne 2025 and in Cinque 2005 and Cinque 2023, among others, let me give a simple argument that movement is at the basis of word order variation.

The order of different classes of adjectives in the languages of the world has been argued to respect a particular semantic/cognitive hierarchy: adjectives that denote more objective (Hetzron 1978 and others), absolute (Frawley 1992 and others), or inherent (Dryer 2018: 816–817 and others) properties occur closer to the noun.⁴ Consider the three adjective classes of color, size, and quality and some of their relative orders (the term *quality*, used here after Sproat & Shih 1991, corresponds to what others call *value*—Plank 2003—or *subjective comment*—Scott 2002):

- (1) A_{quality} A_{size} A_{color} N
 English (Plank 2003: 11)
*a beautiful big red ball*⁵
- (2) N A_{color} A_{size} A_{quality}
 Indonesian (Plank 2003: 11)
bola merah besar tjantik
 ball red big beautiful

languages are considered as the basis for the frequency count, should to some extent temper the serendipity of the sources. It is in any event important to try to document as many languages as possible for each genus, as it turns out that languages belonging to the same genus often show different orders (as is the case in Bantoid, Kuki-Chin, Nilotic, Oceanic, and Ramu-Lower Sepik genera, among others). As for the individuation of genera I again followed Dryer 1992's criteria and classification, also drawing from Ethnologue (Lewis et al. 2015) and Glottolog 4.4 (Hammarström et al. 2021). Needless to say, the determination of the appropriate depth of genetic relatedness (hence of genera) involves an inevitable degree of arbitrariness.

³ “All cross-linguistic word order differences are traceable back to movement differences” (Kayne 2023: 3).

⁴ Hetzron 1978: 178 phrases it as follows: “the major rule is to place the more objective and undisputable qualifications closer to the noun, and the more subjective, opinionlike ones, farther away.”

For the goals relevant here the non-trivial questions of how to establish the precise degree of objectiveness/absolute-ness/inherentness of each adjectival class and what this particular hierarchy/order follows from are not crucial, even though they are important questions.

⁵ This neutral order in English can be overridden in a number of ways, for example, by using parallel rather than stacking structures or by using one adjective in direct modification and the other in indirect modification (as a reduced relative clause). See for example the discussions in Sproat & Shih 1991: sect. 2.3.2, Kemmerer et al. 2007: 240, and Cinque 2010: chaps. 3, 5, among others.

These orders, which respect the principle of relative distance of A_{color} , A_{size} , and A_{quality} from the noun, pre- or post-nominally, are by far the most frequent. I list here only a few of the many languages instantiating these orders.

$A_{\text{quality}} A_{\text{size}} A_{\text{color}} N$

Bangla (Syed 2014: 54–55); **Hungarian** (Hetzron 1978: 170, 173); the Papuan languages **Awa** (Loving 1973: sect. 4.2), **Gimi** (McBride & McBride 1973: 83), **Kewa** (Franklin 1971: 86), and **Kewapi** (Yarapea 2006: 154); the Tibeto-Burman language **Magar** (Grunow-Hårsta 2008: 364); **Turkish** (Bayırlı 2018: sect. 2)

$N A_{\text{color}} A_{\text{size}} A_{\text{quality}}$

The Austronesian languages **Malagasy** (Paul & Potsdam 2024: sect. 3) and **Javanese** (Ishizuka 2008: sect. 3.3); **Basque** (Artiagoitia 2006: sect. 1); the Kwa language **Akan** (Afriyie 2014: sect. 4.2); the Papuan languages **Golin** (Bunn 1974: sect. 2.2.1.1), **Maybrat** (Dol 1999: 142–143), and **Urim** (Hemmilä & Luoma 1987: 122); the Semitic languages **Soqotri** (Makhashen et al. 2008: 13) and **Zahrani Arabic** (Alzahrani 2015: 234); the Tibeto-Burman language **Lolo** (Fu 1997: 191); the Kam-Tai language **Tai Phake** (Morey 2005: 260); the Niger-Congo language **Yorùbá** (Ajíbóyè 2005: 16); the language isolate **Trumai** (Guirardello 1999: 17)

Nonetheless, as noted by Plank 2003, citing Maltese in particular, there are a few languages with post-nominal adjectives that seem to violate this principle, which is, on the other hand, never violated pre-nominally:

- (3) $N A_{\text{quality}} A_{\text{size}} A_{\text{color}}$
 Maltese (Plank 2003: 12)⁶
ballun sabiħ kbir aħmar
 ball beautiful big red

- (4) $*A_{\text{color}} A_{\text{size}} A_{\text{quality}} N$ (Plank 2003: 12)

As Plank notes, in the face of orders like that of Maltese, the principle of relative distance from the noun of the adjective classes color, size, and quality can be retained

⁶ This order is also found in the Niger-Congo Kwa language Leteh (Akrofi Ansah 2014: 12) and possibly also in the Niger-Congo Kordofanian language Asheron, whose nominal order is given in Alamin 2012: sect. 3.4.1 as $N \text{ Dem Num } A_{\text{size}} A_{\text{age}} A_{\text{color}}$.

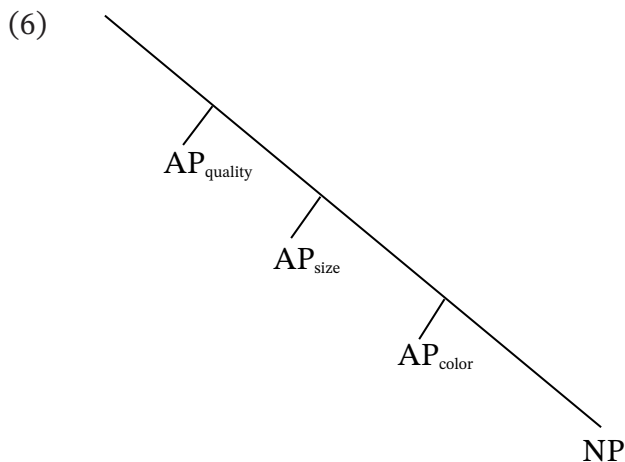
if the noun in (3) is taken to move above all the adjectives from its Merge position below them:

- (5) N A_{quality} A_{size} A_{color} ____
 └────────────────┘

“It is only on such an abstract analysis that the iconic explanation of the relative distance of semantic classes of adjectives from nouns can be upheld” (Plank 2003: 13).⁷

Of course the movement approach involved in the derivation of these different orders must be constrained to derive the actually attested orders without deriving the unattested ones (such as the *A_{color} A_{size} A_{quality} N order of Plank 2003: 12 or the orders *A_{size} A_{color} A_{quality} N and *A_{quality} A_{color} A_{size} N).

The restriction on movement that appears to discriminate between the possible (attested) and impossible (unattested/unattestable) orders, in this and in all the cases discussed below, is that only the Head of the projection, the “engine” of the movement, here the NP, can move along the hierarchy that respects the relative distance of the various adjectival classes from the noun:⁸



If the adjectives could move independently of the NP, we would get unattested orders like the following.

⁷ Also see Plank 2006 and Lahiri & Plank 2009. A similar conclusion is suggested in Hurford 1987: 221 for Greenberg 1963’s “less popular” order N Dem Num A: “Perhaps [it] can be explained by appeal to some kind of topicalization mechanism deriving *houses these five large* from *these five large houses*.”

⁸ Perhaps what drives the Head and only the Head to move to the top of its projection is the need to transmit its categorial feature to each layer of the projection. I assume that the adjectives are actually adjectival phrases (APs; see Cinque 2010: chap. 3) and that the nominal Head is a bare NP not containing the noun complements (see Cinque 2005: fn. 34 and references cited there).

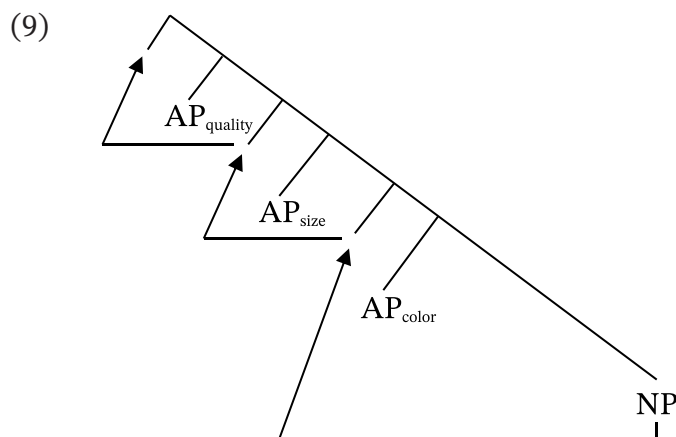
- (7) *AP_{color} AP_{quality} AP_{size} — NP
-

If only the Head of the nominal constituent, the NP, can move, what are the possible ways in which it can move? From *wh* movement (the movement of a relative or interrogative category) we know that the “engine” of the movement, here the *wh* category, can move by itself, as in (8a), or by dragging along a larger constituent containing non-*wh* material below the *wh* phrase itself, as in (8b), or above it, as in (8c), or both below and above it, as in (8d). I refer to these alternative options as *whose pictures* pied piping, *pictures of whom* pied piping, and *pictures of whose pictures* pied piping, respectively.⁹

- (8) a. Aylan, [*who*] you have certainly seen [pictures of []], ...
 b. Aylan, [[*whose*] pictures] you have certainly seen [], ...
 c. Aylan, [pictures of [*whom*]] you have certainly seen [], ...
 d. Aylan, [pictures of [*whose body*]] [] have stirred great global sympathy, ...

When the “engine” is the NP, it can likewise move by itself or via one of the pied piping modes.

If it moves to the top of the hierarchy by itself, as in (9), the order that is obtained is the order of Maltese: NP AP_{quality} AP_{size} AP_{color}.

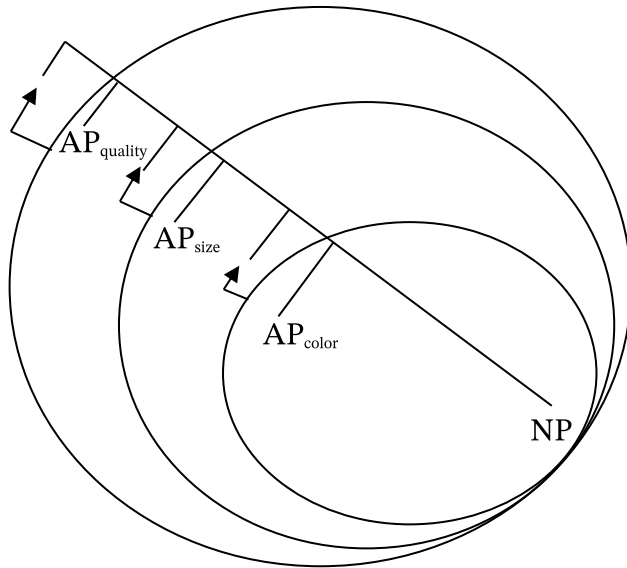


If it moves in the *pictures of whom* pied piping mode, whereby it drags along material immediately above it, the order that is obtained is the order of English or Bangla

⁹ The movements in (8b–d) are called “pied pipings” recalling the pied piper of Hamelin (Ross 1967: 263, fn. 23).

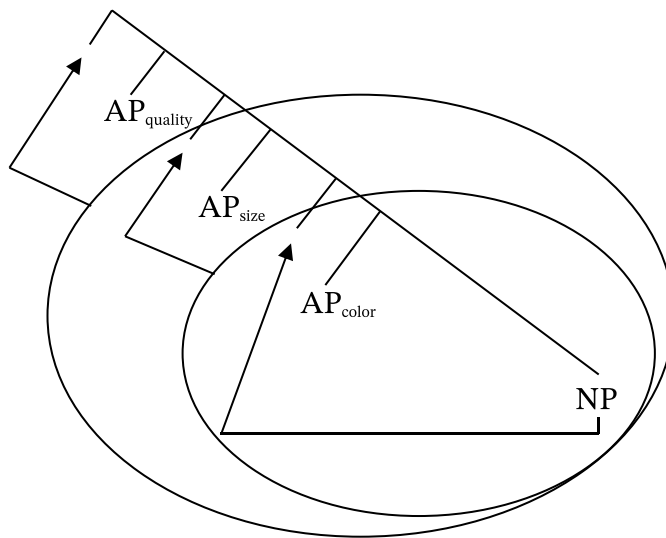
(AP_{quality} AP_{size} AP_{color} NP), in which the relative order of the different adjectives is not altered:

(10)



If the NP moves in the *whose pictures* pied piping mode, as in (11),

(11)



then the order that is obtained is NP AP_{color} AP_{size} AP_{quality} (the mirror image of the order of English and Bangla), in which the order of the different adjectives is reversed. This is the order attested by Akan and Basque, for example. (It is apparently the most frequent order.)

The picture is actually more variegated, in ways compatible with the conclusion just drawn. While pre-nominally only one order is possible ($AP_{\text{quality}} AP_{\text{size}} AP_{\text{color}}$), post-nominally more than two orders are actually possible. In addition to $NP AP_{\text{quality}} AP_{\text{size}} AP_{\text{color}}$ and $NP AP_{\text{color}} AP_{\text{size}} AP_{\text{quality}}$, the following orders are also found.¹⁰

- (12) a. $NP AP_{\text{size}} AP_{\text{color}} AP_{\text{quality}}$
Tatana' (Austronesian; Dunn & Peck 1988: 211)¹¹
- b. $NP AP_{\text{color}} AP_{\text{quality}} AP_{\text{size}}$
Selepet (Papuan, Trans-New Guinea; McElhanon 1972: 81; Dixon 1982: 26, fn. 27)¹²
- c. $NP AP_{\text{quality}} AP_{\text{color}} AP_{\text{size}}$
Umbu-Ungu (Papuan, Chimbu; Head 1976: 67)
Lawa (La-Up dialect; Mon-Khmer; Komonkitiskun 1985: 68)¹³

These orders are derivable, with different combinations of the four movement possibilities seen in (8), from a structure conforming to the principle of relative distance from the noun of AP_{quality} , AP_{size} , and AP_{color} (6).

¹⁰ I am not considering here (due to lack of sufficient documentation) orders that have one or two adjectives on one side of the noun and one or two adjectives on the opposite side, like the case of the Papuan language Gahuku, where color adjectives precede the noun and quality adjectives follow (Deibler 1976: sect. 2.3.5), or the reverse case of Toba (Guaicuruan), where quality adjectives precede the noun and color adjectives follow (Vidal & Manelis Klein 2002: 323–324).

¹¹ “Any change in the order of modifiers was quickly rejected by speakers of the language, indicating that they had a definite order for the adjectives” (Dunn & Peck 1988: 211). The same order is apparently found in Welsh (Flanagan 2014: sect. 8.2.2) and in Kasem (Niger-Congo, Gur; Danti 2007: 122).

¹² The same order is found in Abkhaz (Northwest Caucasian; Hewitt 1989: 59) and in the Niger-Congo Gur language Sisaala-Paasale (McGill et al. 1999: 25).

¹³ For Umbu-Ungu, Head 1976: 67 gives the following template for the nominal phrase (only the relevant parts are reproduced here).

demonstrative noun adjective1 adjective2 adjective3 adjective4
(quality) (colour) (size) (quantity)

For Lawa, Komonkitiskun 1985: 67 says that “a non-inherent quality precedes the color quality and an inherent physical quality respectively,” giving the following example.

- (i) *saim maic khrak teo? ləʔa se*
bird beautiful red small two that
'those two beautiful small red birds'
(Komonkitiskun 1985: 68)

For example the NP AP_{size} AP_{color} AP_{quality} order of Tatana' can be derived by first moving the NP stepwise by itself above AP_{color} and AP_{size} — [NP AP_{size} AP_{color}] — and then by moving the whole constituent above AP_{quality} via the *whose pictures* pied piping option: AP_{quality} [NP AP_{size} AP_{color}].

The NP AP_{color} AP_{quality} AP_{size} order of Selepet can be derived from (6) if the NP first moves above AP_{color} — [NP AP_{color}] — and then the constituent [NP AP_{color}] moves by itself above AP_{size} and AP_{quality}: AP_{quality} AP_{size} [NP AP_{color}].

The order NP AP_{quality} AP_{color} AP_{size} of Umbu-Ungu and Lawa can be derived from the same structure (6) if the NP moves above AP_{color} and then AP_{size} via the *whose pictures* pied piping option and then moves by itself above AP_{quality}: that is, AP_{quality} AP_{size} AP_{color} NP → AP_{quality} AP_{size} [NP AP_{color}] → [AP_{quality} [[NP AP_{color}] AP_{size}]] → NP [AP_{quality} [[AP_{color}] AP_{size}]]. (This derivation is identical to that of the order NP DemP AP NumP in (17l) below.)

These five possible post-nominal orders of adjectives correspond to the five possible post-nominal orders of DemP, NumP, and AP to be seen in (17a, f, g, j, l) below:¹⁴

- | | |
|---|---------------------|
| (13) a. NP AP _{quality} AP _{size} AP _{color} | a'. NP DemP NumP AP |
| b. NP AP _{color} AP _{size} AP _{quality} | b'. NP AP NumP DemP |
| c. NP AP _{size} AP _{color} AP _{quality} | c'. NP NumP AP DemP |
| d. NP AP _{color} AP _{quality} AP _{size} | d'. NP AP DemP NumP |
| e. NP AP _{quality} AP _{color} AP _{size} | e'. NP DemP AP NumP |

The above movement approach to the word order variation in cross-linguistic adjective orders may appear not to be the only account possible, but there are several considerations that support it:¹⁵

First: It allows one to derive all attested orders from one and the same hierarchy that respects the semantic/cognitive principle of relative distance of different modifiers from the Head.

¹⁴ The apparently unattested order N Num Dem A (see the appendix, provided as a supplementary file) would correspond to the order NP AP_{size} AP_{quality} AP_{color}, which is also apparently unattested.

¹⁵ For additional evidence that movement is at the basis of word order variation among languages see Kayne 2000: sects. 15.4, 15.5, Kayne 2011, Kayne 2019–2020, Kayne 2022, Kayne 2023, Kayne 2025, and references cited there.

Second: With the important restriction that only the Head of the projection can move (in one of the possible ways in which movement can take place), it allows the discrimination of possible/attested orders from impossible/unattested ones.

Third: The movement options that it involves are, as we have seen, independently motivated by other clear cases of movement (like *wh* movement).

Fourth, and foremost: The movement approach naturally carries over to the other syntactic domains that display the same pattern of possible and impossible orders: a single order to the left of the Head, more orders to the right.

Among the other domains that display this same pattern are the order of aspectual adverbs and the order of circumstantial PPs:

- (14) Order of aspectual adverbs (Cinque 1999: 42–43, Pearson 2000, Rackowski & Travis 2000)

a. $\text{Adv}_{\text{no longer}} > \text{Adv}_{\text{always}} > \text{Adv}_{\text{completely}} > V$

English, Chinese, ...

b. $*\text{Adv}_{\text{completely}} > \text{Adv}_{\text{always}} > \text{Adv}_{\text{no longer}} > V$

Ø

c. $V > \text{Adv}_{\text{no longer}} > \text{Adv}_{\text{always}} > \text{Adv}_{\text{completely}}$

Italian, (main clause) German, ...

d. $V > \text{Adv}_{\text{completely}} > \text{Adv}_{\text{always}} > \text{Adv}_{\text{no longer}}$

Malagasy, Niuean, ...

- (15) Order of circumstantial PPs (limited here to time, place, and manner PPs, whose order has been investigated from a cross-linguistic perspective by Boisson 1981, Boisson 1993: 106–107, and Lu & Wen 2022; also see Hinterhölzl 2001, Schweikert 2005, Cinque 2006)¹⁶

a. $\text{time} > \text{place} > \text{manner} > V$

Basque, Nambikuara, ... (Kroeker 2001: 3, Lu & Wen 2022: 399)

b. $*\text{manner} > \text{place} > \text{time} > V$

Ø

¹⁶ On the irrelevant interference of focus in the canonical order of circumstantial PPs and possible diagnostics for their canonical order, see Schweikert 2005, Cinque 2006: sect. 2, and Lu & Wen 2022: fn. 3.

- c. V > time > place > manner
Otomi (Oto-Manguean; Boisson 1981: 76), Tanga (Melanesian; Bell 1977: x)
- d. V > manner > place > time
Vietnamese, Yorùbá, ... (Lu & Wen 2022: 399)

For additional cases of this left–right pattern see Cinque 2009, Caha 2017,¹⁷ Koopman 2017,¹⁸ and Kloudová 2020.¹⁹

Of course exactly the same pattern is also attested in the order of Dem, Num, A, and N when all the modifiers are on the same side of the noun (Greenberg 1963; see Cinque 1996, Cinque 2005, Abels & Neeleman 2012, and Cinque 2023, among others):

- (16) a. Dem > Num > A > N
English, Malayalam, ...
- b. *A > Num > Dem > N
Ø
- c. N > Dem > Num > A
Abu‘, Kikuyu, ...
- d. N > A > Num > Dem
Gungbe, Thai, ...

This case is in fact much more telling as we have exhaustive documentation (from a sample of over 2,200 languages) of the possible and impossible combinations of these four elements, both when they are all on the same side of the noun and when some

¹⁷ Caha 2017: 889 notes a particular left–right asymmetry in degree morphology: “When [the superlative marker] and [the comparative marker] precede the adjective, they are found in that order (e.g., Ubykh). When they follow, their order is either the same (e.g., Finnish) or its exact opposite (e.g., Persian).”

¹⁸ Koopman 2017 shows that in the San Mateo del Mar dialect of Huave, a language isolate of the state of Oaxaca, Mexico, first person is always in the same linear position when it precedes the root, while the post-verbal order is variable, clearly due to movement past first person. More generally on the left–right asymmetry in morphology, see Koopman’s ongoing research project Morphology-as-Syntax: A U20 Approach (What Linear Orders Are Attested Given a Particular Hierarchy and Which Ones Are Excluded? A Crosslinguistic Typology) as well as Collins & Kayne 2023 and Shlonsky 2023; all of this work assumes a single computational system for syntax and morphology.

¹⁹ See Kloudová 2020’s refinement of Greenberg 1963’s Universal 39:

A universal constraint on the ordering of case and number:

When case and number precede the noun, then number is always closer to the noun than case. When they follow the noun, both orders are possible (even though the order with number closer to the noun is more frequent).

(Kloudová 2020: 6)

precede and others follow the noun (a documentation that is unfortunately not (yet) as exhaustive in the cases of adjectives, aspectual adverbs, circumstantial PPs, and other modifiers).

As mentioned in the introduction, out of the 24 mathematically possible orders of these four elements ($4! = 24$) *only 14* are genuinely attested (see Cinque 2005, Cinque 2023, *pace* Dryer 2018, on whose putative counter-examples see the appendix to this article, provided as a supplementary file). These 14 orders are given in (17) below, with an indication of the languages and genera instantiating each order.

The orders N A Num Dem, Dem Num A N, and N Dem Num A (17a, b, j) are derived in the same way as the orders N $A_{\text{color}} A_{\text{size}} A_{\text{quality}}$, $A_{\text{quality}} A_{\text{size}} A_{\text{color}}$ N, and N $A_{\text{quality}} A_{\text{size}} A_{\text{color}}$, from a structure/hierarchy [DemP [NumP [AP NP]]]. The remaining 11 of the 14 attested orders are derivable from the same structure/hierarchy via different combinations of the possible movement options for the noun (NP): by itself or in one or the other of the pied piping modes (see (8) above). The derivation of each order is described in (17) (for additional details see Cinque 2005, Cinque 2023).²⁰

- (17)
- | | Languages | Genera |
|---|------------|------------|
| a. N A Num Dem | 652 | 141 |
| In the first step NP moves (vacuously) in the <i>whose pictures</i> pied piping mode above AP; in the second step it moves again in the <i>whose pictures</i> pied piping mode above NumP, dragging along AP; and then it moves in the same mode above DemP in the third step. These movements reverse the order/hierarchy of the modifiers entirely. | | |
| b. Dem Num A N | 457 | 116 |
| In the first step NP moves in the <i>pictures of whom</i> pied piping mode; in the second step it moves in the same pied piping mode; and again in the third step. | | |
| c. Dem N A Num | 214 | 90 |
| In the first step NP moves (vacuously) in the <i>whose pictures</i> pied piping mode above AP; in the second step it moves in the same pied piping mode above NumP; but in the third step it moves in the <i>pictures of whom</i> pied piping mode. | | |

²⁰ In Abels & Neeleman 2012's approach to Greenberg's Universal 20, eight of the 14 orders are generated without movement; but Abels & Neeleman still assume six to be derivable only via movement, and their approach shares the restriction that movement can only involve N or a constituent containing N, moving leftward.

- d. **Dem Num N A** **190** **77**
 In the first step NP moves by itself (or in the *whose pictures* pied piping mode) above AP; in the second step it moves in the *pictures of whom* pied piping mode; and in the third step it moves again in the *pictures of whom* pied piping mode.
- e. **Num N A Dem** **253** **50**
 In the first step NP moves by itself (or in the *whose pictures* pied piping mode) above AP; in the second step it moves instead in the *pictures of whose pictures* pied piping mode (dragging along AP); and in the third step it moves in the same pied piping mode above DemP.
- f. **N A Dem Num** **105** **35**
 In the first step NP moves by itself (or in the *whose pictures* pied piping mode) above AP; in the second step [N A] moves by itself above NumP; and in the third step it moves, again by itself, above DemP.
- g. **N Num A Dem** **73** **35**
 In the first step NP moves by itself above AP and in the second step above NumP; in the third step it moves (dragging along [N Num A]) in the *whose pictures* pied piping mode above DemP.
- h. **Dem N Num A** **49** **29**
 In the first step NP moves by itself above AP and in the second step, again by itself, above NumP; in the third step it moves (dragging along [N Num A]) in the *pictures of whose pictures* pied piping mode.
- i. **Dem A N Num** **52** **28**
 In the first step NP moves in the *pictures of whom* pied piping mode; in the second step [A N] moves instead in the *pictures of whose pictures* pied piping mode above NumP; and in the third step it moves (dragging along [A N Num]) in the same pied piping mode.
- j. **N Dem Num A** **93** **27**
 In the first step NP moves by itself above AP; in the second step it moves again by itself above NumP; and it does the same in the third step, moving above DemP.
- k. **Num A N Dem** **55** **21**
 In the first step NP moves in the *pictures of whom* pied piping mode; it does the same in the second step, while in the third step [Num A N] moves in the *pictures of whose pictures* pied piping mode above DemP.

l. **N Dem A Num** **33** **17**

In the first step NP moves in the *whose pictures* pied piping mode above AP; in the second step it moves in the same pied piping mode above NumP; in the third step NP moves instead above DemP by itself, without pied piping.

m. **A N Num Dem** **34** **13**

In the first step NP moves in the *pictures of whom* pied piping mode; in the second step it moves above NumP in the *pictures of whose pictures* pied piping mode; and in the third step it moves in the same mode above DemP.

n. **A N Dem Num** **21** **9**

In the first step NP moves in the *pictures of whom* pied piping mode; in the second step [A N] moves by itself above NumP; and in the third step it moves in the same mode above DemP.

Total: **2,281**

A movement account of word order variation within the nominal extended projection also promises to shed light on (some of) the different frequencies of the orders in (17), partly, at least, on independent grounds. The most frequent order (N A Num Dem) is the one obtained by a consistent application of the *whose pictures* pied piping mode, the second most frequent (Dem Num A N) being the one obtained by a consistent application of the *pictures of whom* pied piping mode. We independently know, from *wh* movement, that the *whose pictures* type of pied piping is less marked than the *pictures of whom* type, as the latter is more restricted (whatever the ultimate explanation of this difference may be).²¹ See the following contrasts in English *wh* interrogatives and restrictive relatives.²²

- (18) a. *Whose pictures do you keep in your wallet?*
b. **?Pictures of whom do you keep in your wallet?*

- (19) a. *I wonder whose pictures they published yesterday.*
b. **I wonder pictures of whom they published yesterday.*

²¹ If pied piping is a function of the merger of Cable 2007's overt or null Q morpheme on top of different nominal constituents, with the *wh* morpheme ultimately overtly or covertly moving to spec,Q (cf. Coon 2009), perhaps the different costs associated with the two types of pied piping could depend on the shorter versus longer movement of the *wh* phrase to spec,Q in the [*whose* [*pictures*]] pied piping type and the [[*pictures*] [*of* [*whom*]]] pied piping type, respectively. See Coon 2009 on the inability of "feature percolation" to account for certain Mayan facts.

²² I thank Richard Kayne, Andrew Radford, Ian Roberts, and Peter Svenonius for sharing their judgments on the two types of pied piping.

- (20) a. *Here is someone whose pictures have always appealed to her.*
 b. **Here is someone pictures of whom have always appealed to her.*

Somewhat surprisingly, consistent movement of the N by itself (yielding Greenberg's "less popular" order N Dem Num A; see Greenberg 1963: 87) appears to be an option even more marked, judging from its frequency, than the consistent application of the *pictures of whom* pied piping type (as far as the derivation of canonical word orders is concerned). Another factor that appears to play a role in the markedness of a certain word order (hence its frequency across languages) is the change from a less marked movement option to a more marked one (e.g., from the *whose pictures* type of pied piping to the *pictures of whom* type or to movement without pied piping). For independent evidence that this affects the frequency of the order obtained see Cinque 2023: sect. 5.3. But more work needs to be done on the fine-grained calculation of the costs associated with each type of movement for a fuller explanation of the frequency of the orders in (17).

The unattested 10 orders of Dem, Num, A, and N, given in (21), are not derivable under the condition that only the Head NP can move (by itself or in one of the pied piping modes; see Cinque 2005, Cinque 2023).

- (21) a. **Dem A Num N*
 b. **Num A Dem N*
 c. **A Num Dem N*
 d. **Num Dem A N*
 e. **A Dem Num N*
 f. **A Num N Dem*
 g. **A Dem N Num*
 h. **Num Dem N A*
 i. **Num N Dem A*
 j. **N Num Dem A*

Even more significantly, Barbiers 2005, Abels 2011, Abels 2016, and Barbiers et al. 2018 (also see Koopman 2002, Wurmbrand 2004, Wurmbrand 2017, Van Craenenbroeck et al. 2019) provide evidence that exactly the same pattern is found with the order of modals, auxiliaries, and lexical verbs, *within a single language family, Germanic*. This result, if correct, reinforces the preferability of a movement account over the account

advocated by Dryer 2018 in terms of surface iconic principles such as “The adjective and numeral tend to occur closer to the noun than the demonstrative when they (the adjective and the demonstrative and/or the numeral and the demonstrative) occur on the same side of the noun” and “The adjective tends to occur closer to the noun than the numeral when they occur on the same side of the noun.”²³ The reason is that such iconic principles are too parochial; they are specific to the order of demonstratives, numerals, adjectives, and noun in the nominal phrase. They cannot be directly extended to the order of other elements displaying the same pattern in the nominal and clausal domains. One would have to concoct distinct iconic principles for each new domain. The movement approach generalizes to all such domains naturally (the same movement options are involved).

Also, Dryer 2018’s iconic principles appear to me to essentially restate the facts rather than to attempt to derive them, in a way that discriminates precisely the attested orders from the unattested orders.²⁴ If the quality of a theory is how much it excludes (without excluding what is actually found), only the movement approach sketched above attains this goal, discriminating the orders that are attested (more generally, **attestable**) from those that are not attested (**non-attestable**). The formulations used in Dryer’s iconic principles, such as “The adjective and numeral **tend** ...” and “The adjective **tends** ...” (likewise “The Symmetry Principles **apply more strongly** ... ,” “the demonstrative

²³ Dryer’s five iconic principles are reported here:

Symmetry Principle 1: The adjective and numeral tend to occur closer to the noun than the demonstrative when they (the adjective and the demonstrative and/or the numeral and the demonstrative) occur on the same side of the noun.

Symmetry Principle 2: The adjective tends to occur closer to the noun than the numeral when they occur on the same side of the noun.

Asymmetry Principle: The Symmetry Principles apply more strongly to prenominal modifiers than they do to postnominal modifiers; exceptions to the Symmetry Principles will occur only with postnominal modifiers.

Principle 4: (Greenberg’s Universal 18) When the descriptive adjective precedes the noun, the demonstrative and the numeral, with overwhelmingly more than chance frequency, do likewise.

Principle 5: Intra-Categorical Harmony. The demonstrative, numeral, and adjective tend to all occur on the same side of the noun.

²⁴ Steedman 2020, in not treating the unique canonical order(s) of a language separately from other informationally laden orders that co-occur in the same language (as in Shupamem—Nchare 2012), decided to set aside this important point, taking the typology to be fundamentally Zipfian, with languages that are not attested still possible in principle.

See instead Ouwayda & Shlonsky 2017 for an approach treating multiple attested orders in Lebanese Arabic separately from the question of deriving cross-linguistically attested canonical orders.

and the numeral, with **overwhelmingly more than chance frequency ...**,” “The demonstrative, numeral, and adjective **tend ...**”; see footnote 23), do not exclude anything; in particular they do not exclude the orders that are never found.

Other possible advantages of a movement approach over a system of iconic principles include the fact that it offers a simple and direct way to account for the existence of more than one canonical order in a single language and for minimal word order differences between closely related languages or dialects (when it can be shown, e.g., that a single extra movement can derive the difference in the order of Dem, Num, A, and N). Here follow a couple of cases, among those that could be cited.

2.2 Micro-variation within one and the same language (more than one canonical order)

Italian and other Romance languages show a systematic variation in the order of adjectives with respect to the noun (N A and A N). The order Dem Num N A is often taken as the canonical order since it is more frequent than the order Dem Num A N, but this statistical conclusion obscures deeper semantic generalizations concerning the nature of the adjectives that can precede the N and those that can only follow. Predicative, intersective, and restrictive adjectives have to follow the noun while non-predicative, non-intersective, and non-restrictive adjectives can either precede or follow it. See Cinque 2010 and Cinque 2014 for evidence of this and for arguments that the different position of the adjective in the two cases is a consequence of the movement of the noun (or of larger constituents containing the noun).²⁵

²⁵ A similar situation is found in Nuosu (Sino-Tibetan), for which Gerner 2013: sects. 5.1, 5.2.3 reports the order A_{non-restrictive} N A_{restrictive} (Num Dem). The opposite segregation of restrictive and non-restrictive adjectives is found in some Miao languages, which, according to Gerner 2019: 103, “allow attributive adjectives to occur before or after the head noun with a semantic difference. They restrict reference of the noun before the noun; similarly, they describe the noun without restricting reference after the noun.” Here is one of Gerner’s examples, from Hmong:

- (i) a. *lo⁵⁴ go⁵⁴ ηao⁴²*
 CL old boat
 ‘the old boat’ (restrictive)
- b. *lo⁵⁴ ηao⁴² go⁵⁴*
 CL boat old
 ‘the boat, which is old’ (non-restrictive)
 (Gerner 2019: 103)

The same segregation as in Hmong is found in Oksapmin (Trans–New Guinea; Loughnane 2009: sect. 7.5), in Piro (Arawakan; Hanson 2010: sect. 6.2), and in Truku Seediq (Austronesian; Saillard 2019: sect. 4).

Istro-Romanian provides another case of two canonical orders for adjectives. In this language, “adjectives occur pre-nominally, except for nationality adjectives derived by suffixation with *-an*, which are obligatorily postposed” (Zegrean 2012: 93):

- (22) a. *Io cunosc ur taljanski/*taljan fečor.*
 I know an Italian/Italian boy
 ‘I know an Italian boy.’
 b. *Io cunosc ur fečor taljan/*taljanski.*
 I know a boy Italian/Italian
 ‘I know an Italian boy.’

Once again there are two canonical orders, depending this time on the morphological nature of the adjective rather than its semantic nature (also see Dragomirescu & Nicolae 2022: 228).

While in these two cases movement is perhaps not the only way one can relate the two canonical orders (one could simply say, in a way incompatible with Antisymmetry, that some adjectives are linearized to the left of the noun and others to its right), in other languages movement seems to be the only plausible option. One such language is Mehri (Semitic, South Arabian), as persuasively argued in Shlonsky 2020. Mehri displays two canonical orders depending on the nature of the cardinal numerals. ‘One’ and ‘two’ follow the N, the overall order being N Dem Num A. ‘Three’ and higher numerals are pre-nominal, the overall order being Dem Num N A.²⁶ Here are the examples provided by Shlonsky:

- (23) a. *a-k’əló:mət əlyó:məh θró:h ‘á:fər*
 the-pens DEM.PROX.P two red.P
 ‘those two red pens’
 b. *əlyó:məh rəbó:t kəyú:g ṭyéx*
 DEM.PROX.P four men old
 ‘those four old men’
 (Shlonsky 2020: 156)

²⁶ Rood 2017: 45 reports that for some speakers ‘three’ behaves like ‘one’ and ‘two’ in being post-nominal (though not obligatorily).

Shlonsky suggests that these orders can be accounted for by taking the base-generated hierarchy/order to be $\text{Dem} > [\text{Num} \geq \text{'three'}] > [\text{Num} = \text{'one'}, \text{'two'}] > \text{A} > \text{N}$ and having the noun (more precisely, the minimal noun phrase) move step by step to a position immediately above, and therefore to the left of $\text{Num} = \text{'one'}, \text{'two'}$, from where it can raise above Dem (giving rise to the order N Dem Num A). The noun however cannot move above $\text{Num} \geq \text{'three'}$, and since it cannot skip it, it also remains below Dem (giving rise to the order Dem Num N A). The two orders thus appear to differ in how far the noun raises: just to the left of adjectives with numerals from 'three' onward, all the way to the top with numerals 'one' and 'two'.²⁷

2.3 Micro-variation between closely related varieties

The two closely related varieties of Standard and Western Basque can be taken to differ with respect to the presence or absence of one movement step. Standard Basque features the order Num N A Dem and Western Basque the order Dem Num N A (Artiagoitia 2006: fn. 23). Under a movement analysis they differ only in the lack of movement of $[\text{Num N A}]$ across Dem in Western Basque (ultimately from one and the same underlying hierarchy/order, $\text{Dem} > \text{Num} > \text{A} > \text{N}$).²⁸ For another case of micro-variation in word order among closely related varieties based on movement, see Koopman 2017: 43–44 on different dialects of Huave.

3 Conclusion

Dryer 2018's approach to the order of demonstratives, numerals, adjectives, and noun in the nominal phrase compares unfavorably with the movement approach advocated in Cinque 2005 and Cinque 2023. Its iconic principles are tailored to apply just to

²⁷ There is no decisive reason to consider pre- and post-nominal numerals to differ in category, even though 'one' and 'two' agree in gender when post-nominal. This in fact recalls the case of Dolomite Ladin, where adjectives inflect for plural number only when post-nominal (Rasom 2008). I thank Masha Polinsky and Ur Shlonsky for relevant discussion on this point.

²⁸ All Basque varieties have the numeral 'one' (*bat*) in post-nominal position. Western Basque differs from Standard Basque in having the numeral 'two' (*bi*) post-nominally as well (Laka 1996: sect. 5.1). I thank Richard Kayne for pointing out to me this difference between the two Basque varieties. Western Basque thus features N A Num Dem as an additional canonical order (derived by the consistent application of the *whose pictures* pied piping mode). See the example provided in Artiagoitia 2006: 124:

(i) *mutil eder bi hauek*
 boy beautiful two these
 'these two beautiful boys'

those nominal elements (not to mention the fact that they essentially restate the facts that they are intended to explain). In particular they cannot carry over directly to the order of other elements displaying the exact same pattern in the nominal and clausal domains, as seen above. One would have to contrive distinct iconic principles for each such domain. The movement approach suggested in Cinque 2005 and Cinque 2023, as well as here, generalizes to all such domains naturally, as the same movement options are involved (for the Head of each projection or for larger constituents containing the Head).

The appendix to this article (see the supplementary material) considers the putative counter-examples to Cinque 2005 mentioned in Dryer 2018, arguing, as mentioned in the introduction, that on closer inspection they prove to be either spurious or far from constituting clear counter-evidence, as the seemingly problematic orders co-occur with other orders that are admitted as possible in Cinque 2005. The larger sample of over 2,200 languages utilized here (see footnote 2 for the links to the sample) amply confirms that the 14 orders isolated in Cinque 2005 are the only possible (and attested) cross-linguistic *canonical* orders of Dem, Num, A, and N.

Supplementary material

A file containing the appendix can be downloaded at <https://doi.org/10.16995/star.17346.s1>.

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Competing interests

The author has no competing interests to declare.

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