Revisiting the Typology of Equation Constructions:

Perspectives from Mandarin

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1 Background

- Constructions expressing the equation of entities, degrees, and other various semantic objects, or *Equation Constructions (EQs)*:

  (1) Ann drives the same car as [Beth].
  the $\text{car}_{\text{A drives}}$= the $\text{car}_{\text{B drives}}$ / the kind $_{\text{of car A drives}}$ = the kind $_{\text{of the car B drives}}$

  (2) Ann is as tall as [Beth].
  the $\text{degree}_{\text{A is tall to}}$ (is at least) = the $\text{degree}_{\text{B is tall to}}$ (literal equatives)

  (3) Ann is tall like [a tree].
  the $\text{way}_{\text{A is tall}}$ = the $\text{way}_{\text{a tree is tall}}$ (non-literal equatives)

  (4) Ann danced like [Beth/a bear].
  the $\text{way}_{\text{A danced}}$= the $\text{way}_{\text{B danced}}$ (similatives)

- EQs involve (some of) the following basic elements[1]:

Comparee		**$\text{PM}_{\text{Parameter Marker}}$**	**Parameter**	**$\text{SM}_{\text{Standard Marker}}$**	**Standard**
Ann	drove the	same	car	as_{SM}	[Beth]
Ann	is	as_{PM}	tall	as_{SM}	[Beth]
Ann	is		tall	like/as_{SM}	[a tree]
Ann			danced	like/as_{SM}	[Beth/a bear]

Parameter: introducing the dimension of being compared
$\text{PM}_{\text{Parameter Marker}}$: explicitly marking the equation relation

[1] Haspelmath and Buchholz (1998) (henceforth HB); Rett (2013); Treis and Vanhove (2017).

- Two kinds of PMs most common:
  - Demonstrative-based: German *so*, Dutch *zo*, Mandarin *na-yang* 'that-kind'
  - Adjective-based: English *equally*, Finnish *yhtä*, Mandarin *yi-yang* 'one-kind'
- One interesting typological generalization regarding EQs among others:

> **Haspelmath and Buchholz (1998) (henceforth HB)**
>
> Languages using a PM to form literal equatives tend to form non-literal equatives and similatives without a PM.

  - French (HB: 311): PM is not allowed in non-literal equatives and similatives

(5) a. Ma sœur est *(**aussi**) grande que moi.
my sister is so_{PM} big as_{SM} me
'My sister is as tall as me.' (literal equative)

b. La tomate est (***aussi**) petite comme une olive.
the tomato is so_{PM} small like an olive
'The tomato is small like an olive.' (non-literal equative)

c. John a (***aussi**) dansé comme elle a dansé.
John has so_{PM} danced like she has danced
'John danced as she danced.' (similative)

  - German: PM is optional in non-literal equatives and similatives (p.c. Alex Wimmer)

(6) a. Nadin ist *(**so**) groß wie Anna.
Nadin is so_{PM} tall as_{SM} Anna
'Nadin is as tall as Anna' (literal equative)

b. Dieses Gebäude ist (**so**) hoch wie ein Berg.
this building is so_{PM} high as_{SM} a mountain
'This building is high like a mountain' (non-literal equative)

c. John (**so**) tanzte wie Maria.
John danced so_{PM} as_{SM} Maria
'John danced as Maria did' (similative)

- Implications of this typology:
  - The correlation between meaning and form:

Equation of degrees	**Equation of manners**
(literal equatives)	(non-literal equatives, similatives)
⇕	⇕
Mode A	**Mode B**
(Presence of PM)	(Absence of PM)

  - Rett (2013): the presence of the PM indicates whether what is being equated is a *lexicalized argument* (LA) of the parameter

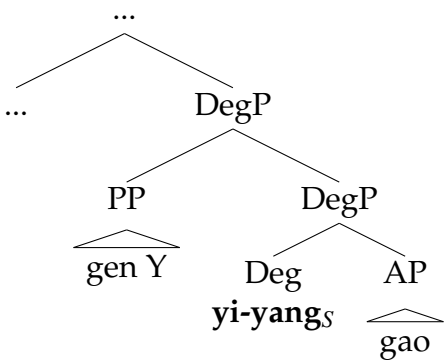
...	...
↓	↓
Degree: LA of gradable Adjs	Manner: not LA of Adjs/Vs

- Mandarin as an apparent counter-example to the typology of EQs (Zhu 1982; Chen 2010; Luo and Cao 2018; Zhang 2020; Lai 2020):

(7) a. Zhangsan gen [Lisi] **yi-yang** gao.
ZS as$_{SM}$ LS one-kind tall
'Zhangsan is as tall as [Lisi]'
b. Zhangsan xiang [shu] **na-yang /yi-yang** gao
ZS like tree that-kind one-kind tall
'Zhangsan is tall like [a tree]'
c. Zhangsan xiang [Lisi /xiong] **na-yang** tiaowu.
ZS like LS bear that-kind dance
'Zhangsan dances like [Lisi/a bear]'

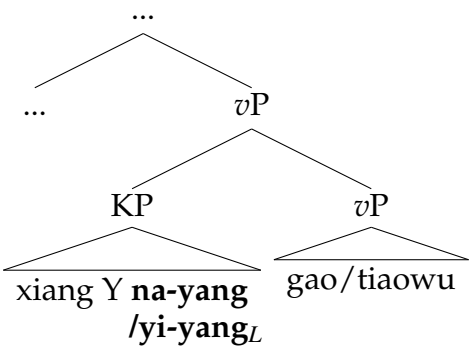
- Proposal: The typology can be maintained in Mandarin if we work with a more constrained definition of PMs (e.g. selecting the parameter).

(8) **Strategy A** (Degree-equating)



→ True PM as Deg head

(9) **Strategy B** (Manner-equating)



→ 'Fake' PM as part of the adjunct

- Roadmap:
  - Sec 2: Motivation for the distinction between two equation strategies
  - Sec 3: A formal compositional analysis
  - Sec 4: Cross-linguistic implications
  - Sec 5: Conclusions

2 Motivation for two distinct equation strategies

Basic properties of two kinds of pM (henceforth a cover term for true and fake PMs):

	pM in Mode A	**pM in Mode B**	
	yi-yang$_S$	*na-yang*	*yi-yang*$_L$
1. Relatively stressed	YES	NO	NO
2. Standard marker	prefer *gen*	prefer *xiang*	prefer *xiang*
3. Occur before both Adj and V	Adj only	BOTH	BOTH

1. Whether the standard or the pM receives stress (see Zhu 1982 on two kinds of *yi-yang*):
   - A: The pM is [stressed] relative to the standard

     (10) Zhangsan gen wo [yi-yang]$_S$ gao.
     ZS as$_{SM}$ me one-kind tall
     'Zhangsan is as tall as I' (literal equative)

     Not to read as: *Zhangsan gen [wo] yi-yang$_L$ gao.
   - B: The standard is [stressed] relative to the pM

     (11) Zhangsan xiang {[shu] na-yang /yi-yang$_L$} gao.
     ZS like tree that-kind one-kind tall
     'Zhangsan is tall like a tree' (non-literal equative)

     Not to read as: *Zhangsan xiang shu [na-yang/yi-yang$_S$] gao.

     (12) a. Zhangsan xiang [Lisi] na-yang tiaowu.
     ZS like LS that-kind dance
     'Zhangsan dances like Lisi'
     b. Zhangsan xiang [xiong] yi-yang$_L$ tiaowu.
     ZS like bear one-kind dance
     'Zhangsan dances like a bear' (similative)

     Not to read as: *Zhangsan xiang {Lisi/xiong} [na-yang/yi-yang$_S$] tiaowu.

2. Preference of standard markers:
   - A: *gen* is more typical (*xiang* is marginal) (see also Zhu 1982; Zhang 2020)

     (13) Zhangsan {gen/??xiang} Lisi yi-yang$_S$ gao.
     ZS as$_{SM}$/like LS one-kind tall
     'Zhangsan is as tall as Lisi' (literal equative)
   - B: *xiang* is more typical (*gen* is less typical)

     (14) Zhangsan {xiang /?gen} {xiong na-yang /yi-yang$_L$} gao.
     ZS like /as$_{SM}$ tree that-kind one-kind tall
     'Zhangsan is tall like a bear' (non-literal equative)

(15) a. Zhangsan {xiang /?gen} Lisi na-yang tiaowu.
ZS like /as$_{SM}$ LS that-kind dance
'Zhangsan dances like Lisi'
b. Zhangsan {xiang /?gen} xiong yi-yang$_L$ tiaowu.
ZS like /as$_{SM}$ bear one-kind dance
'Zhangsan dances like a bear' (similatives)

3. Can occur before both Adjectival and Verbal parameters (i.e. cross-categorial):

   – A: Non-cross-categorial

   (16) Zhangsan gen Lisi yi-yang$_S$ {gao /*tiaowu}.
   ZS as$_{SM}$ LS one-kind tall dance
   Int: 'Zhangsan is {as tall as Lisi /dances like Lisi}'

   – B: Cross-categorial

   (17) Zhangsan xiang Lisi na-yang {gao /tiaowu}.
   ZS like LS that-kind tall dance
   'Zhangsan is {tall like Lisi /dances like Lisi}'

   (18) Zhangsan xiang xiong yi-yang$_L$ {gao /tiaowu}.
   ZS like bear one-kind tall dance
   'Zhangsan is {tall like a bear /dances like Lisi}'

- Clarification: Literal and non-literal equatives are also known as specific and generic equatives (Haspelmath and Buchholz 1998), but it should not be taken to mean that syntactically they can only combine with token/kind-denoting phrases.

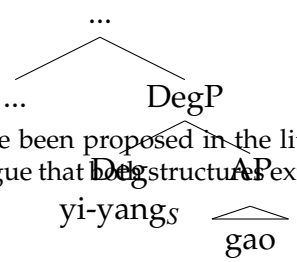
(19) Zhangsan gen [Lisi /shu] yi-yang$_S$ gao.
ZS as$_{SM}$ LS tree one-kind tall
'Zhangsan is as tall as [Lisi/a tree]' (literal equation)

(20) Zhangsan xiang [Lisi /shu] {na-yang /yi-yang$_L$} gao.
ZS as$_{SM}$ LS tree that-kind one-kind tall
'Zhangsan is tall like [Lisi/a tree]' (non-literal equation)

2.1 Selecting vs. Adjoining to the parameter

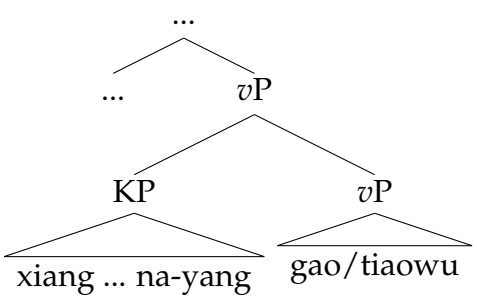
Further evidence for the following structural differences (following Zhu 1982): [2]

(21)



[2]Both the Deg head structure and the adjoining structure have been proposed in the literature (see Chen 2010; Luo and Cao 2018; Cao and Luo 2023, yet few of them argue that both structures exist and correspond to two distinct kinds of equation modes).

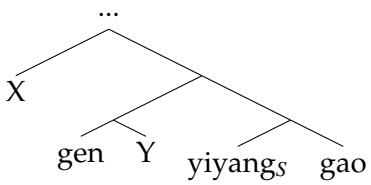
(22)



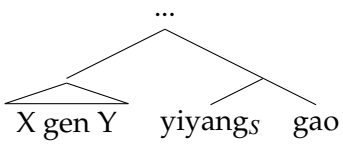
1. Constituency: whether the pM forms a constituent with the parameter directly

- A: the pM forms a constituent with the parameter directly

(23) External use (*gen* as a preposition)



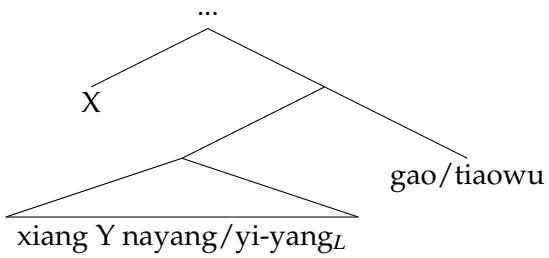
(24) Internal use (*gen* as a conjunction):



(25) a. Zhangsan gen Lisi [yiyang$_S$ gao] haishi [yiyang$_S$ zhong]?
'Is Zhangsan as tall as Lisi or as heavy as Lisi?'
b. [Zhangsan gen Lisi] yiyang$_S$ gao. → [Tamen] yiyang$_S$ gao.
'[Zhangsan and Lisi]/[They] are equally tall'
c. Zhangsan [gen Lisi yiyang$_S$ gao] haishi [gen wo yiyang$_S$ gao]?
'Is Zhangsan as tall as Lisi or as tall as me?'
d. ?Zhangsan [gen Lisi yiyang$_S$] haishi [gen wo yiyang$_S$] gao?
Int: 'Is Zhangsan as tall as Lisi or as tall as me?' (probably due to RNR)

- B: the pM does NOT form a constituent with the parameter directly

(26)



(27) a. ??Zhangsan xiang shu [na-yang gao] haishi [na-yang xi]?
'Is Zhangsan tall like a tree or slim like a tree?'
b. [Zhangsan xiang shu] na-yang gao. → *[Tamen] na-yang gao.
Int: '[Zhangsan and the tree/they] are tall alike.'
c. Zhangsan [xiang shu na-yang gao] haishi [xiang shan na-yang gao]?
'Is Zhangsan tall like a tree or tall like a hill?'
d. Zhangsan [xiang shu na-yang] haishi [xiang shan na-yang] gao?
'Is Zhangsan tall like a tree or like a hill?'

(28) a. ??Zhangsan xiang xiong [na-yang paobu] haishi [na-yang tiaowu]?
'Does Zhangsan run like a bear or dance like a bear?'
b. [Zhangsan xiang xiong] na-yang tiaowu. → *[Tamen] na-yang tiaowu.
Int: '[Zhangsan and the bear]/[They] dance alike.'
c. Zhangsan [xiang xiong na-yang tiaowu] haishi [xiang she na-yang tiaowu]?
'Does Zhangsan dance like a bear or dance like a snake?'
d. Zhangsan [xiang xiong na-yang] haishi [xiang mifeng na-yang] tiaowu?
'Does Zhangsan dance like a bear or like a snake?'

2. Whether the pM blocks the formation of *de*-resultative

- A: The sentence cannot form a *de*-resultative.

(29) a. Zhangsan gen Lisi yi-yang$_S$ gao. 'Zhangsan is as tall as Lisi'
b. ??Zhangsan gao de [gen Lisi yi-yang$_S$].
ZS tall DE as$_{PM}$ Lisi one-kind
Int: 'Zhangsan is tall to the same extent as Lisi '

- B: The sentence can form a *de*-resultative.

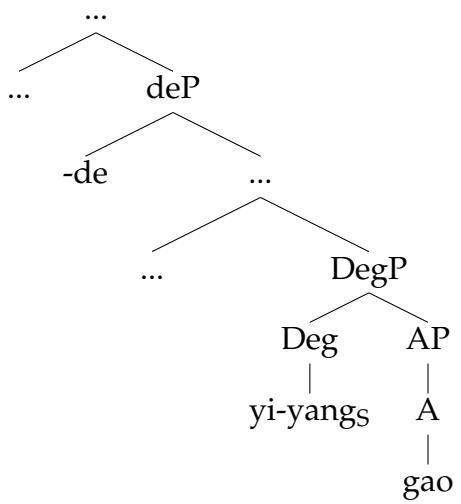
(30) a. Zhangsan xiang Lisi na-yang gao. 'Zhangsan is tall like Lisi'
b. Zhangsan gao de [xiang Lisi na-yang].
ZS tall DE like$_{PM}$ Lisi that-kind
Int: 'Zhangsan is tall like Lisi '

(31) a. Zhangsan xiang shu yi-yang$_L$ gao. 'Zhangsan is tall like a tree'
b. Zhangsan gao de [xiang shu yi-yang$_L$].
ZS tall DE like$_{PM}$ tree one-kind
'Zhangsan is tall like a tree '

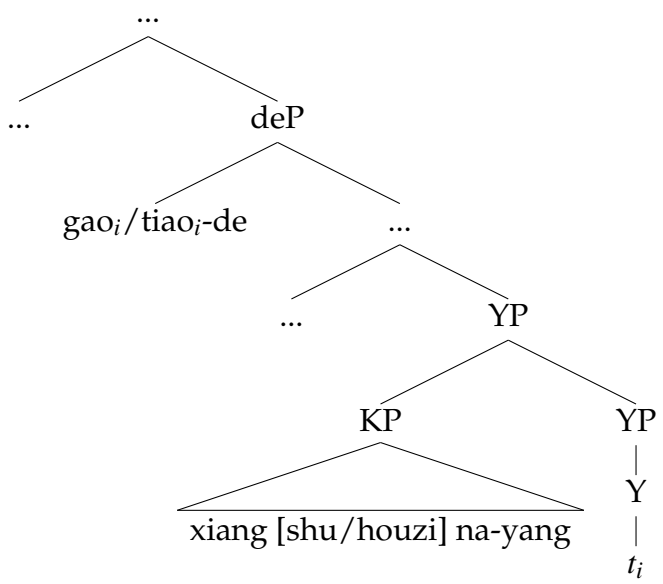
(32) a. Zhangsan xiang houzi na-yang tiao. 'Zhangsan jumps like a monkey'
b. Zhangsan tiao de [xiang houzi na-yang].
ZS jump DE like$_{PM}$ monkey that-kind
'Zhangsan jumps like a monkey'

- Explanation: the main predicate moves to the resultative head *de* (Lai 2021a: p.116; Sybesma 2023)

(33) *yi-yang$_S$* as a Deg head on the clausal spine blocks the head movement



(34) pM-Bs are not heads on the clausal spine so the head movement is not blocked



⇒ Another piece of evidence that 'xiang ... na-yang' forms a constituent, excluding the parameter

3. A-not-A question formation

- A: the pM can be targeted

(35) Zhangsan gen Lisi yi-bu-yi-yang$_S$ gao?
ZS as$_{SM}$ LS one-NEG-one-sort tall
"Is Zhangsan as tall as Lisi or not?"

Alternatively:

(36) Zhangsan gen Lisi shi-bu-shi yiyang$_S$ gao?
ZS as$_{SM}$ LS be-NEG-be one-sort tall
"Is Zhangsan as tall as Lisi?"

(37) Zhangsan shi-bu-shi gen Lisi yiyang$_S$ gao?
ZS be-NEG-be as$_{SM}$ LS one-sort tall
"Is Zhangsan as tall as Lisi?"

- B: the pM cannot be targeted

(38) *Zhangsan xiang tree na-bu-na-yang gao?
ZS like tree that-NEG-that-sort tall
"Is Zhangsan such tall as a tree?"

(39) *Zhangsan xiang shu shi-bu-shi nayang gao?
ZS like tree be-NEG-be that-sort tall
"Is Zhangsan such like a tree?"

Instead:

(40) Zhangsan {xiang-bu-xiang shu /shi-bu-shi xiang shu} nayang gao?
ZS like-NEG-like tree be-NEG-be like tree that-sort tall
"Is Zhangsan such tall like a tree?"

Similatives pattern with non-literal equatives:

(41) *Zhangsan xiang Lisi {na-bu-na-yang /shi-bu-shi nayang} tiaowu?
ZS like LS that-NEG-that-sort be-NEG-be that-sort dance
"Does Zhangsan dance like Lisi?"

(42) Zhangsan {xiang-bu-xiang Lisi /shi-bu-shi xiang Lisi} nayang tiaowu?
ZS like-NEG-like LS be-NEG-be like LS that-sort dance
"Does Zhangsan dance like Lisi?"

- Explanation: Mode B patterns with regular manner modifiers (Law 2006)

(43) 'Does Zhangsan dance fast?'
a. *Zhangsan feikuai-de {tiao-bu-tiaowu /shi-bu-shi tiaowu}?
b. Zhangsan {?fei-bu-feikuai-de/shi-bu-shi feikuai-de} tiaowu?

4. Position of modifiers like *jingran* 'unexpectedly', *jihu* 'almost' (see similar tests using the negation adverb *bu* in Zhu 1982)

- A: pre-standard or post-standard

(44) ZS <jingran /jihu> gen Lisi <jingran /jihu> yi-yang$_S$ gao.
ZS unexpectedly almost as$_{SM}$ LS unexpectedly almost one-sort tall
"Zhangsan is {unexpectedly/almost} as tall as Lisi"

- B: pre-standard only, cannot be post-standard

(45) ZS <jingran/jihu> xiang shu <*jingran/*jihu> nayang gao.
ZS unexpectedly/almost like tree unexpectedly/almost that-sort tall
"Zhangsan is {unexpectedly/almost} tall like a tree."

(46) ZS <jingran/jihu> xiang Lisi <*jingran/*jihu> nayang tiaowu.
ZS unexpectedly/almost like LS unexpectedly/almost that-sort dance
"Zhangsan {unexpectedly/almost} dances like Lisi."

2.2 Evaluativity

- Non-literal equatives are often considered to be evaluative, namely implying the comparee/standard is positively Adj (Haspelmath and Buchholz 1998; Rett 2013):

  (47) John is tall like a tree. $\rightsquigarrow$ John is tall, in the same way as a tree is tall.

  (48) This hole is deep as sea. $\rightsquigarrow$ This hole is deep, in the same way as a sea is deep.

- Literal equatives are not evaluative:

  (49) John is as tall as Zengzhiwei. $\not\rightsquigarrow$ John (/ZZW) is tall.

  (50) This hole is as deep as my pot. $\not\rightsquigarrow$ This hole (/my pot) is deep.

- Mandarin non-literal equatives are claimed to be evaluative (Sun 2019; Zhang 2020):

  (51) #ta xiang habiren yi-yang$_L$ gao.
  3SG like Hobbits one-kind tall
  '#He is tall like hobbies' (Zhang (2020): ex. (11))

  (52) Yuehan xiang Bier na-yang gao ma? #Suiran Bier gou ai le.
  John like Bill that-kind tall YNQ though Bill enough short LE
  'Is John tall like Bill? Though Bill is already short' (Sun (2019): ex.(11b))

- Contrasting with literal equatives:

  (53) Yuehan gen Zengzhiwei yi-yang$_S$ gao, dou shi 1.59m.
  John as$_{SM}$ ZZW one-kind tall, all be 1.59m
  'John is as tall as Zengzhiwei; both are 1.59m.'

- However, it seems too hasty to conclude that non-literal equatives are evaluative because we can easily find the following corpora online:

  (54) Lixiaoran ... lian kanqilai jiu xiang bazhang na-yang da.
  LXR ... face look just like palm that-kind big
  'Lixiaoran ... her face looks just like how big a palm is'

  (55) Buguo, ... liulian qishi hen xiao, xiang bazhang yi-yang$_L$ da.
  however durian actually very small like palm one-kind big
  'However ... the durians are actually small, like how big the palm is'

- More examples by introspection:

  (56) Zhangsan bijiao ai, dagai xiang Zengzhiwei na-yang gao.
  John quite short roughly like ZZW that-kind tall
  'John is quite short, roughly like how tall Zengzhiwei is'

(57) Zhe-ge keng hen qian, jiu xiang wo-de guozi yi-yang$_L$ shen.
this-CL hole very shallow just like my pot one-kind deep
'This hole is shallow, just like how deep my pot is'

- A more precise description: Without other salient information, non-literal equatives tend to be evaluative; however, this inference is not entailed and can be canceled.

- The nature of such an inference resembles a particular kind of implicature (Grice 1967; Horn 1984; Levinson 2000):

(58) Mary broke a finger.
⇝ Mary broke her finger (Quantity-2: "Say no more than you must")

This implicature is different from scalar implicatures (driven by Quantity-1)

(59) Mary ate some of the cake.
⇝ Mary didn't eat all of the cake. (Quantity-1: "Say as much as you can")

- Upper-bounding vs. Lower-bounding (Horn 1984):

(60) Quantity-1 implicature: ⟦S′⟧ is more informative than ⟦S⟧ (and is relevant to the topic under discussion), thus uttering S implicates ¬⟦S′⟧.

(61) Quantity-2 implicature: ⟦S′⟧ is more informative than ⟦S⟧ and is the stereotypical case of ⟦S⟧, thus uttering S implicates ⟦S′⟧.

- This Quantity-2 implicature tends to exist without explicit cancelation:

(62) Mary broke a finger, but not her finger. It's John's finger.

It can even project, explaining why Sun (2019) considers the evaluative inference of the standard presupposed.

(63) Did Mary break a finger?
⇝ Did Mary break her finger.

2.3 Interim summary

- There exists two distinct modes of equation in Mandarin:
  - Mode A is reserved for literal equatives;
  - Mode B is reserved for non-literal equatives and similatives.

	Mode A	**Mode B**
	PM: *yi-yang*$_S$	pM: *na-yang*/*yi-yang*$_L$
1. Relatively stressed	YES	No
2. Standard marker	prefer *gen*	prefer *xiang*
3. Cross-categorial	NO	YES
4. Relation to Parameter	Head	Part of its adjunct
5. Literal equation (with Adj)	YES (degree$_1$=degree$_2$)	NO
6. Evaluativity (with Adj)	NO	Implied but defeasible

- The typological generalization can be largely maintained:
  - Mandarin non-literal equatives indeed morphologically pattern with similatives, rather than literal equatives.
  - The apparent parameter marker (pM) in non-literal equations and similatives indeed has a different syntactic status than *yi-yang*$_S$ in literal equatives.
- How to formally capture their differences?

3 A formal compositional analysis

- Mode A equates sets of degree (featured by true PM *yi-yang*$_S$);
- Mode B equates eventuality-kinds (featured by fake pM *na-yang/yi-yang*$_L$)

3.1 Basic assumptions

① Both event-kinds and degree objects are needed in the ontology.

– Manners and degrees (as a special kind of manners) can both be represented as Chierchia-style kinds of eventualities (Anderson and Morzycki 2015; Luo and Cao 2018):

- all possible dogs constitute the nominal kind DOG (Chierchia 1998)
- all possible events performed CLUMSILY constitute the event-kind CLUMSILY
- all possible states measured positively tall and held in a straight posture constitute the state-kind STRAIGHT-TALL
- all possible states measured 6 feet along the spatial dimension constitute the state-kind SIX-FEET

(64) D_k is a set of kind objects in D (represented by $k, k', ...$)

(65) D_o is a set of non-kind objects in D ($o, o', ...$):
D_e is a set of non-kind individuals in D_o ($x, y, z, ...$)
D_v is a set of non-kind events in D_o ($e, e', ...$)
D_s is a set of non-kind states in D_o ($s, s', ...$)

Motivation: Polish *tak* 'such' can be anaphoric to nominal kinds, manners, and degrees (Anderson and Morzycki 2015); same for Mandarin *na-yang* (Sun 2019).

(66) **taki** pies
such-MASC dog
'such a dog'

(67) **tak** się zachowywać
such REFL behave
'behave that way'

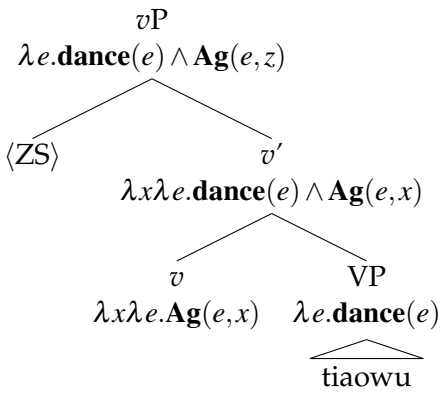
(68) **tak** wysoki
such tall
'that tall'

– Degree objects are independently needed since Mandarin morphologically distinguishes mode A for equation of degrees only (Sun 2019):

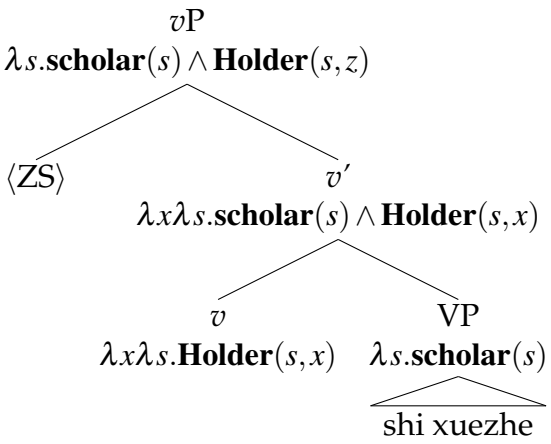
(69) D_d is a set of degree objects in D_o $(d, d', ...)$

② Neo-Davidson event(uality) semantics (Davidson 1969; Kratzer 1996):

(70)

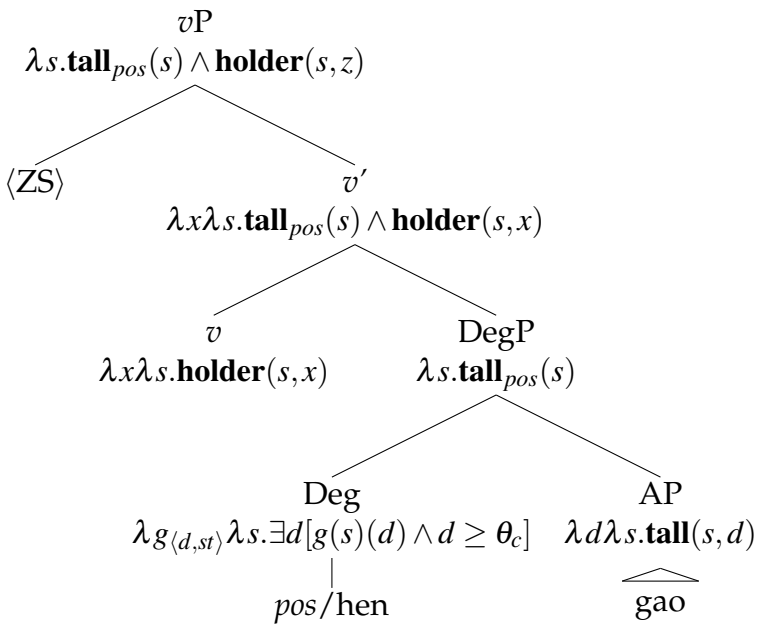


(71)



– Extending to the cases in which the main predicates are gradable adjectives (Wellwood 2015; Baglini 2015).

(72)



Under its positive interpretation, a *pos* morpheme is assumed (adapted from Cresswell 1976; Bierwisch 1989; Kennedy 1999).

③ LF assumptions concerning the standard phrases

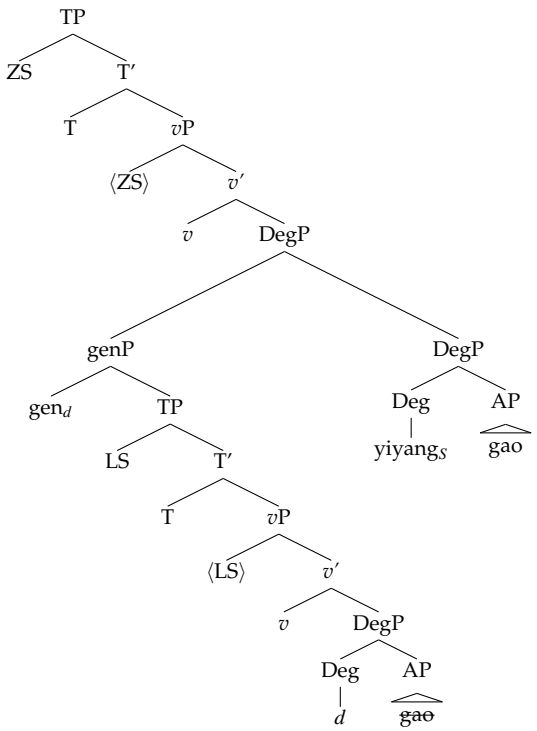
– Evidence for the availability of clausal standards (based on Liu 2014):

(73) Zhangsan qunian gen [Lisi jinnian] yi-yang$_S$ gao
ZS last.year as LS this.year one-kind tall
'Zhangsan last year was as tall as how Lisi is tall this year.'

(74) Zhangsan xiang [Lisi paobu] na-yang tiaowu.
ZS like LS run that-kind dance
'Zhangsan danced like how Lisi ran'

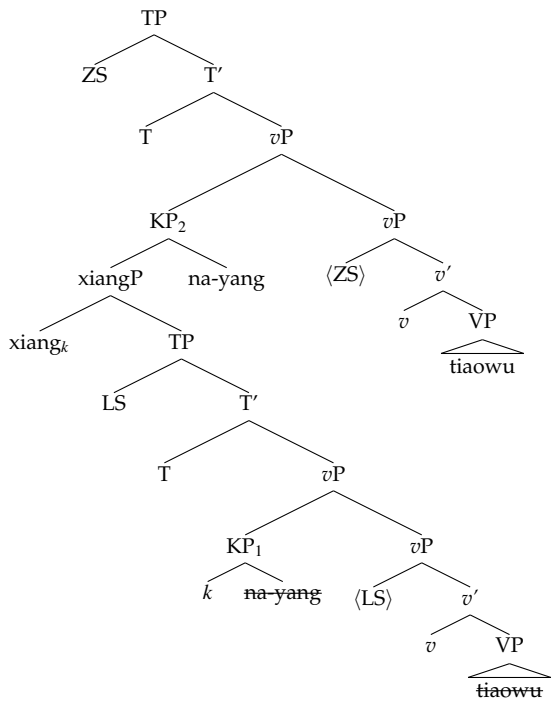
– The clausal standard structurally mirrors the matrix clause but with deletion (based on Heim 1985; Liu 1996; Anderson and Morzycki 2015; Luo and Cao 2018, a.o.)

(75) Zhangsan gen Lisi yi-yang$_S$ gao.



Abbreviated: $\rightsquigarrow$ [$_{\text{genP}}$ gen$_d$ Lisi v d-~~gao~~]

(76) Zhangsan xiang Lisi na-yang tiaowu.



Abbreviated: $\rightsquigarrow$ [$_{\text{xiangP}}$ xiang$_k$ Lisi k-~~nayang~~ v ~~tiaowu~~]

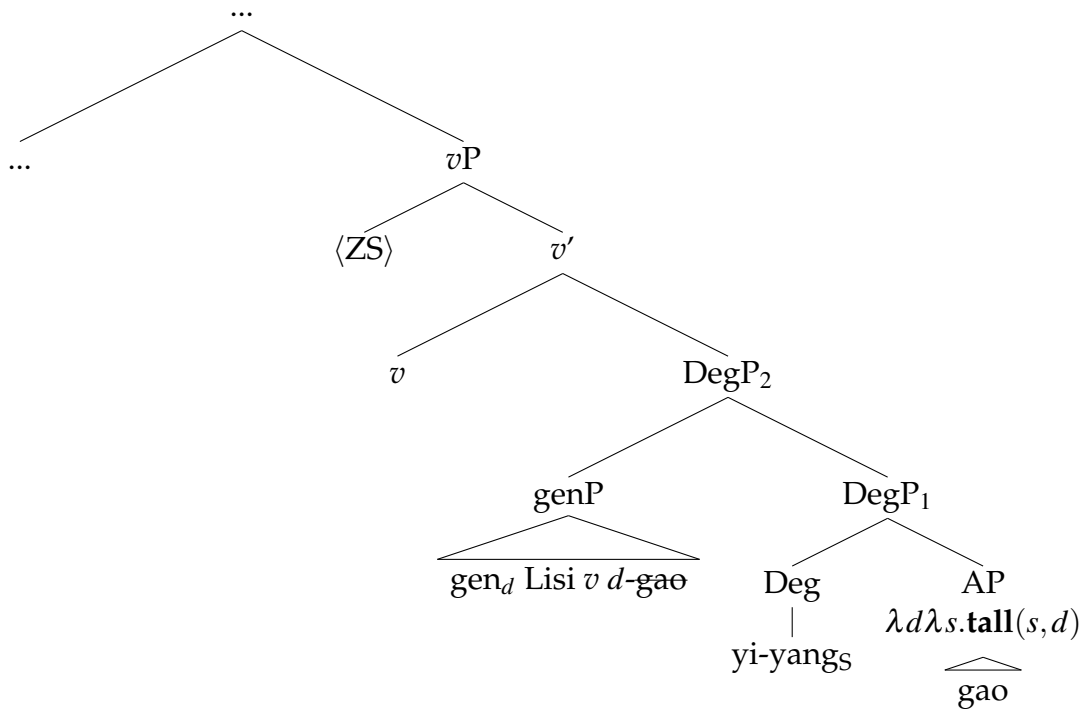
3.2 Proposal

3.2.1 Mode A

True PM yi-yang$_S$ equates sets of degrees:

(77) $[\![\text{yi-yang}_S]\!] = \lambda g_{\langle d,st\rangle}\lambda D_{\langle d,t\rangle}\lambda s.\{d : G(d)(s)\} = \{d' : D(d')\}$

(78) [$_{\text{TP}}$ Zhangsan gen Lisi yi-yang$_S$ gao].



i. $[\![[_{\text{DegP}_1}\ \text{yi-yang}_S\ \text{gao}\ ]]\!] = \lambda D_{\langle d,t\rangle}\lambda s.\{d : \mathbf{tall}(d)(s)\} = \{d' : D(d')\}$

ii. $[\![\text{genP}]\!] = \lambda d.\exists s[\mathbf{tall}(s,d) \wedge \mathbf{holder}(s,z)]$ (λ-abstraction over the free degree variable)

iii. $[\![\ \text{DegP}_2]\!] = \lambda s.\{d : \mathbf{tall}(s,d)\} = \{d' : \exists s'[\mathbf{tall}(s',d') \wedge \mathbf{holder}(s',l)]\}$

iv. $[\![v\text{P}]\!] = \lambda s.\mathbf{holder}(s,z) \wedge (\{d : \mathbf{tall}(s,d)\} = \{d' : \exists s'[\mathbf{tall}(s',d') \wedge \mathbf{holder}(s',l)]\})$

v. $[\![\text{TP}]\!] = \exists s[\mathbf{holder}(s,z) \wedge (\{d : \mathbf{tall}(s,d)\} = \{d' : \exists s'[\mathbf{tall}(s',d') \wedge \mathbf{holder}(s',l)]\})]$

The proposed account can explain:

- Mode A is not cross-categorial (since it cannot equate eventuality-kinds);
- Mode A expresses literal equation (i.e. equation of degrees);
- Mode A prefers SM *gen*: *gen* is the λ-abstraction operator over degree variables
- No evaluativity: the Deg position is occupied by *yi-yang$_S$* so that the *pos* meaning is not entailed.

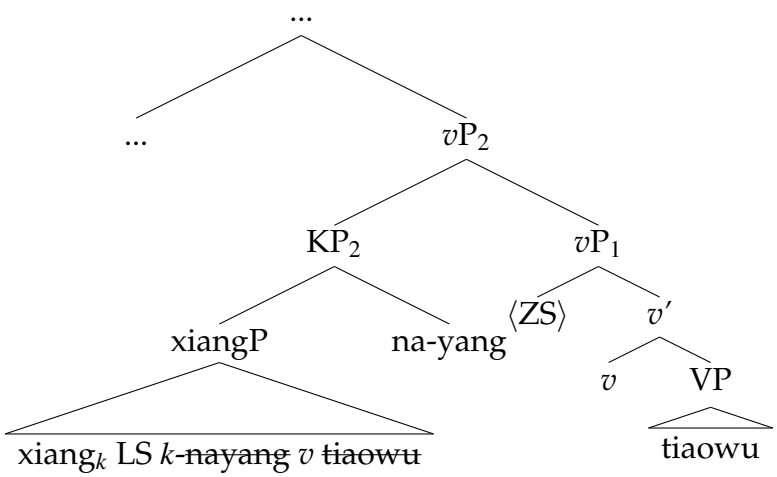
3.2.2 Mode B

Fake pM equates kind objects:

(79) $[\![\text{na-yang/yi-yang}_L]\!] = \lambda k \lambda o.^{\cup} k(o)$ (adopted from Anderson & Morzycki 2015)
where $^{\cup}$ is an operator that maps a kind to the corresponding property

1. Equating event-kinds (in similatives)

(80) $[_{\text{TP}}$ Zhangsan xiang Lisi na-yang tiaowu]



i. λ-abstraction over the kind variable k in the elided clause:
$[\![[_{\text{xiangP}}\ \text{xiang}_k\ \text{Lisi}\ k\text{-}\sout{\text{nayang}}\ v\ \sout{\text{tiaowu}}]\!] = \lambda k.\exists e[\textbf{dance}(e) \wedge \textbf{holder}(e,l) \wedge^{\cup} k(e)]$

$\Rightarrow$ ι-shift: $\iota k[\exists e[\textbf{dance}(e) \wedge \textbf{holder}(e,l) \wedge^{\cup} k(e)]]$
(following Caponigro 2004; Anderson and Morzycki 2015)

ii. $[\![KP_2]\!] = \lambda o.^{\cup} \iota k[\exists e[\textbf{dance}(e) \wedge \textbf{holder}(e,l) \wedge^{\cup} k(e)]](o)$

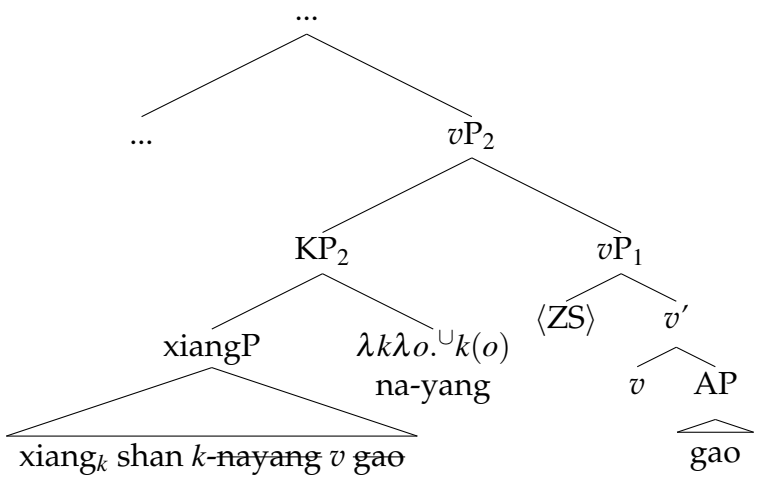
iii. $[\![vP_1]\!] = \lambda e'.\textbf{dance}(e') \wedge \textbf{Ag}(e',z)$

iv. $[\![vP_2]\!] = \lambda e'.\textbf{dance}(e') \wedge \textbf{Ag}(e',z) \wedge^{\cup} \iota k[\exists e'[\textbf{dance}(e') \wedge \textbf{holder}(e',l) \wedge^{\cup} k(e)]](e')$

v. $[\![TP]\!] = \exists e'[\textbf{dance}(e') \wedge \textbf{Ag}(e',z) \wedge^{\cup} \iota k[\exists e'[\textbf{dance}(e') \wedge \textbf{holder}(e',l) \wedge^{\cup} k(e)]](e')]$

2. Equating state-kinds (in non-literal equatives)

(81) [$_{TP}$ Zhangsan xiang shan na-yang gao]



i. $[\![\text{AP}]\!] = \lambda d\lambda s'.\textbf{tall}(s',d)$ (Existential closure: $\rightsquigarrow \lambda s'.\exists d[\textbf{tall}(s',d)]$)

ii. $[\![vP_1]\!] = \lambda s'.\textbf{Holder}(s',z) \wedge \exists d[\textbf{tall}(s',d)]$

iii. $[\![\text{xiangP}]\!] = \lambda k.\exists s[\textbf{Holder}(s,l) \wedge \exists d[\textbf{tall}(s,d)] \wedge^{\cup} k(s)]$

$\Rightarrow$ ι-shift: $\iota k[\exists s[\textbf{Holder}(s,l) \wedge \exists d[\textbf{tall}(s,d)] \wedge^{\cup} k(s)]]$

iii. $[\![KP_2]\!] = \lambda o.^{\cup}\iota k[\exists s[\textbf{Holder}(s,l) \wedge \exists d[\textbf{tall}(s,d)] \wedge^{\cup} k(s)]](o)$

iv. $[\![vP_2]\!] = \lambda s'.\textbf{Holder}(s',z) \wedge \exists d[\textbf{tall}(s',d)] \wedge^{\cup} \iota k[\exists s[\textbf{Holder}(s,l) \wedge \exists d[\textbf{tall}(s,d)] \wedge^{\cup} k(s)]](s')$

v. $[\![\text{TP}]\!] = \exists s'[\textbf{Holder}(s',z) \wedge \exists d[\textbf{tall}(s',d)] \wedge^{\cup} \iota k[\exists s[\textbf{Holder}(s,l) \wedge \exists d[\textbf{tall}(s,d)] \wedge^{\cup} k(s)]](s')]$

The proposed account can explain:

- Mode B is cross-categorial (since it equates kind objects);
- Mode B expresses non-literal equation (i.e. equation of nominalized properties of eventualities);
- Mode B prefers SM *xiang*: *xiang* is the λ-abstraction operator over kind variables
- Evaluativity is not entailed. $\rightarrow$ But why is it conversationally implicated?

This can be captured by the uniqueness/familiarity-based presupposition:

- The stereotypical, salient kinds of the states of holding height are states whose measure exceeds the relevant threshold;
- But this assumption can be overridden when the context explicitly establishes a salient kind of states whose measure does not exceed the threshold.

Further support: mode A is symmetric while mode B is not.

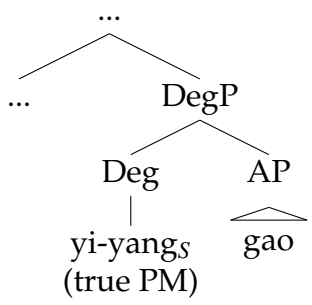
(82) Zhangsan gen Lisi yi-yang$_S$ gao.
→ Lisi gen Zhangsan yi-yang$_S$ gao.

(83) Zhangsan xiang [shu] {na-yang/yi-yang$_L$} gao.
→ #[Shu] xiang Zhangsan {na-yang/yi-yang$_L$} gao.

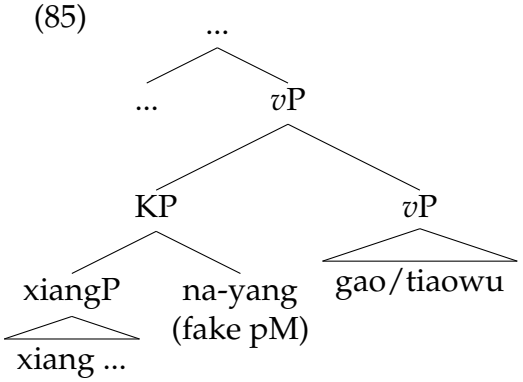
4 Cross-linguistic implications

- A new definition PMs: True PMs hold a Head-Comp relation with the parameter.

(84)



(85)



- This way we can maintain the typological generalization:

Haspelmath and Buchholz (1998) (henceforth HB)

Languages using a PM to form literal equatives tend to form non-literal equatives and similatives without a PM.

4.1 German

Hohaus and Zimmermann (2021) proposes that German is a counter-example to this generalization: PMs do seem to occur in both non-literal equatives and similatives (without expressing the meaning of degree equation).

(86) a. Nadin ist *(**so**) groß wie Anna.
Nadin is so$_{PM}$ tall as$_{SM}$ Anna
'Nadin is as tall as Anna' (literal equative)

b. Dieses Gebäude ist (**so**) hoch wie ein Berg.
this building is so$_{PM}$ high as$_{SM}$ a mountain
'This building is high like a mountain' (non-literal equative)

c. John (**so**) tanzte wie Maria.
John danced so$_{PM}$ as$_{SM}$ Maria
'John danced as Maria did' (similative)

However, there are clear syntactic differences between literal equatives (A) on the one hand and non-literal equatives and similatives (B) on the other:

- The occurrence of *so* is obligatory in A while optional in B (p.c. Alex Wimmer).
- In (86-c), *so* can have a different position:

(87) John tanzte (**so**) wie Maria.
John danced so_{PM} as_{SM} Maria
'John danced as Maria did' (similative)

It is not impossible that the same word *so* has different syntactic positions in German, just like *yi-yang* has two distinct uses.

4.2 Cantonese

The counterparts of Mandarin *yi-yang* and *na-yang* in Cantonese can actually co-occur, suggesting they have distinct syntactic positions (Lai 2020, 2021b, 2023):

(88) Nei5 tung4 keoi5 jat1-joeng6 gam3 leng3.
you as her one-kind so pretty
'You are as pretty as her' (From Lai 2021b: ex. (63))

Future questions to ask: any syntactic and semantic differences between the following sentences in Cantonese (using the relative gradable adjective 'tall')?

(89) a. Nei5 tung4 keoi5 jat1-joeng6 gou1.
you as her one-kind tall
'You are as tall as her'
b. Nei5 ci5 keoi5 gam3 gou1.
you like her so tall
'You are tall like how tall she is'
c. Nei5 ci5 keoi5 jat1-joeng6 gam3 gou1.
you like her one-kind so tall
'You are tall as her'

5 Conclusions

- A careful examination into Mandarin equatives and similatives shows that they do not *challenge* but actually *support* the typological generalization in HB's.
- A strong correlation between meaning and form in language:

Equation of degrees	**Equation of eventuality-kinds (/manners)**
(literal equatives)	(non-literal equatives, similatives)
⇕	⇕
Strategy A	**Strategy B**
(Presence of true PM)	(Absence of true PM)

– END –

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