

# On Projecting Causality

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## Abstract

Causation is familiar as a meaning component in the V-domain, but it can also be found in the C-domain, as witnessed by a variety of *wh*-adverbial, reflexive adverbial and light verb construals in Mandarin. This paper explores the idea that a loosely organized hierarchy of causality can be stretched from the first phase (i.e., the V-domain) up to the second phase (i.e., the C-domain) along the clausal spine according to the analyticity setting of Chinese. It is shown that all the causality construals under investigation here displays a systematic correspondence between their distributions and interpretations in cartographic terms. We also draw on evidence from non-canonical usages of *how*-expressions across languages to demonstrate that the “height of interpretation” does matter at the syntax-semantics interface.

## 1. Introduction

An important aspect of the cartographic approach concerns its attempt to “syntacticize as much as possible the interpretive domains” (cf. Cinque and Rizzi 2012). This move begs the question, “syntax preempts semantics and pragmatics, but how?” One way to think of the issue is to build a loosely organized syntactic hierarchy based upon the “height of interpretation”, a term borrowed from Hacquard (2006). As Ramchand and Svenonius (2014) shows, the traditional C-T-V split of a sentence structure may well reflect the ontological arrangement of proposition-situation-event (see also Platzack 2000; Wiltschko 2014). On the other hand, the cause-process-result hierarchy encoded by the first phase syntax in Ramchand’s (2008) sense is often extended beyond the vP periphery, manifesting itself up to the CP domain in Chinese, presumably due to its robust analyticity (cf. Huang 2015, Tsai 2015).

In this paper, we are to combine the insights from both projects, and see how the notion of causality can be projected along the clausal spine. Altogether there are three types of implicit causative projection that will be placed under our investigation. They all involve eventuality construals (in contrast to agentivity/activity) in the peripheral areas. Our argumentation is organized as follows: Section 2 starts with distinguishing eventuality causation from agentive causation by mapping out a variety of light verb construals in causative, instrumental, affective, and long passive constructions. This analysis also lays grounds for the inner-outer dichotomy of functional elements along the clausal spine. In Section 3, the first phase syntax is stretched to the second phase with a view to accounting for the distribution-interpretation correspondences of *wh*-adverbials such as *zenme(yang)* ‘how(manner)’ and *wei(-le) shenme* ‘for(-PRF) what’ (PRF is perfective). We argue that this follows from the parametric setting of analyticity in Chinese. In Section 4, it is demonstrated that this more flexible cartographic account carries over to the inner-outer dichotomy of reflexive adverbials, providing a straightforward account of the distributive contrast between (anti-)causality and (anti-)comitativity. Section 5 concludes this paper by pointing out that the best way to characterize the cause-effect relationship underpinning the three types of construals is to make space for a silent causative projection in the left periphery.

## 2. Implicit Causative Projection for Chinese Outer Light Verbs

### 2.1 *The First Phase Syntax vs. the Second Phase Syntax*

In terms of the first phase syntax, Mandarin Chinese sports a plethora of light verbs within vP that introduce both core and non-core (applicative) arguments (cf. Huang 1994, 1997; Lin 2001; Feng 2003, 2005; Tang 2010; among others). For instance, the causative light verb *rang* ‘cause, let’ in (1) may introduce an agentive causer (CL is classifier):

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- (1) qunian women rang haoji-jia feiji tuiyi.  
*last.year we cause several-CL airplane retire*  
 ‘Last year we let several airplanes retire.’  
 去年我們讓好幾架飛機退役。

Alternatively, we may “transitivize” the main predicate *tuiyi* ‘retire’ of (1) by raising it to replace the causative light verb in question, as shown below:

- (2) qunian women **tuiyi** haoji-jia feiji.  
*last.year we retire several-CL airplane*  
 ‘Last year we retired several airplanes.’  
 去年我們退役好幾架飛機。

According to Huang (1994), this indicates that Mandarin allows a silent counterpart of *rang* (represented as CAUSE), which attracts the main verb to maintain its prosodic weight in PF, hence the apparent transitivity in (2). The derivation is given below:

- (3) qunian women [<sub>VP</sub> CAUSE haoji-jia feiji **tuiyi**].  
*last.year we several-CL airplane retire*  
 ⇒ qunian women [<sub>VP</sub> **tuiyi**-CAUSE haoji-jia feiji <~~tuiyi~~>].

On the other hand, there is also a class of light verbs that introduce applicative arguments such as instrument, beneficiary, affectee, and location (cf. Lin 2001, Feng 2003, among others). For example, the applicative light verb *yong* ‘use, with’ in (4) introduces an instrument argument *zheba dao* ‘this knife’:

- (4) zheci women **yong** zhe-ba dao qie.  
*this.time we use this-CL knife cut*  
 ‘This time we use this knife to cut.’  
 這次我們用這把刀切。

Again, we may transitivity the main verb *qie* ‘cut’ by moving it to occupy the locus of *yong*, resulting in the surface VO order:

- (5) zheci women **qie** zhe-ba dao .  
*this.time we cut this-CL knife*  
 ‘This time we use this knife to cut.’  
 這次我們切這把刀。

Similarly, this so-called “syntax-semantics mismatch” is derived by adjoining *qie* to a silent instrumental light verb, represented as USE below (dubbed an inner light verb in Tsai’s (2015) terms):

- (6) zheci women [<sub>VP</sub> **USE** zhe-ba dao qie].  
*this.time we this-CL knife cut*  
 ⇒ zheci women [<sub>VP</sub> **qie**-USE zhe-ba dao <~~qie~~>].

As seen in the English translations of (1) and (2), the alternation between the “syntactic” and “lexical” causatives is not that remarkable in itself by typological comparison. Nevertheless, the pattern displayed by (4) and (5) is quite unique as it is essentially an analytic version of Bantu applicative constructions, where a discrete semi-functional verb is employed instead of a verbal affix along the clausal spine, triggering word order change when it is silent, as in (6).

There is yet another dimension to this analytic maneuver of (semi-)functional elements. It is instructive to note that the cause-process-result hierarchy mentioned above is “loosely organized” such that it may be scaled up to the second phase syntax, i.e., to the CP domain, presumably due to the macro-parameter setting of analyticity in Huang’s (2015) sense. To see this, first we would like to point to a higher-order construal of the causative predicate *rang* ‘cause’, as shown below (RES is result):

- (7) na-ben shu rang [wo kan-de touhunyanhua].  
*that-CL book cause I read-RES dizzy*  
 ‘That book made me dizzy through reading it.’  
 Lit. ‘That book caused the event that I read it till dizzy.’  
 那本書讓[我看得頭昏眼花]。

Again, (7) has a less articulated alternative that involves the now familiar word order change (cf. Huang 1994, among others):

- (8) na-ben shu kan-de [wo touhunyanhua].  
*that-CL book read-RES I dizzy*  
 ‘That book made me dizzy through reading it.’  
 那本書看得[我頭昏眼花]。

As one might expect from our line of thinking, (8) is analyzed to contain a silent counterpart of *rang*, i.e., CAUSE, in the left periphery (dubbed an outer light verb in Tsai’s (2015) terms). It selects a FinP complement, and attracts the verbal complex *kan-de* ‘read-RES’ from within, as shown by the following derivation:

- (9) [<sub>CauP</sub> na-ben shu [CAUSE [<sub>FinP</sub> wo kan-de touhunyanhua]]]  
*that-CL book I read-RES dizzy*  
 ⇒ [<sub>CauP</sub> na-ben shu [[kan-de]-CAUSE [<sub>FinP</sub> wo <kan-de> touhunyanhua]]]

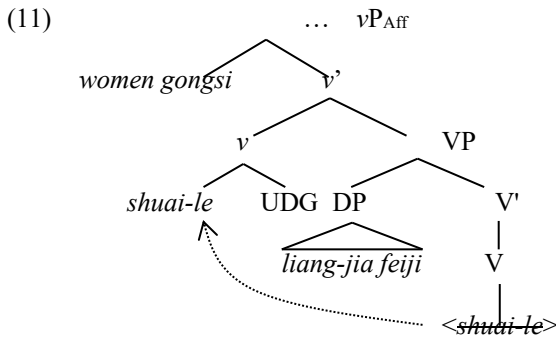
The difference between (2) and (8) thus lies in the fact that the former involves an agentive causative light verb in the edge area of vP (cf. Belletti 2005; Paul 2005; Tsai 2015), whereas the latter involves an eventuality causative light verb in the edge area of CP. We therefore have a case in hand where the causative hierarchy in question has been stretched from the first phase to the second phase in a non-trivial way.

### 2.2 Stringing up Inner and Outer Light Verbs

Another argument for a causative projection in the left periphery comes from the inner-outer dichotomy of unaccusative predicates. First consider the so-called double unaccusative construction such as (10):

- (10) women gongsi shuai-le liang-jia feiji!  
*we company crash-PRF two-CL airplane*  
 ‘Two airplanes have crashed on our company!’  
 我們公司摔了兩架飛機！

The sentence is not causative but affective, which can be understood as ‘our company suffered from two airplanes crashing’. We propose that *women gongsi* ‘our company’ actually plays an affectee role, and is hosted by a silent affective light verb UDG (undergo) in its subject position. The main predicate *shuai-le* ‘crash-PRF’ then raises to UDG in the now familiar fashion, as sketched in the following tree diagram:



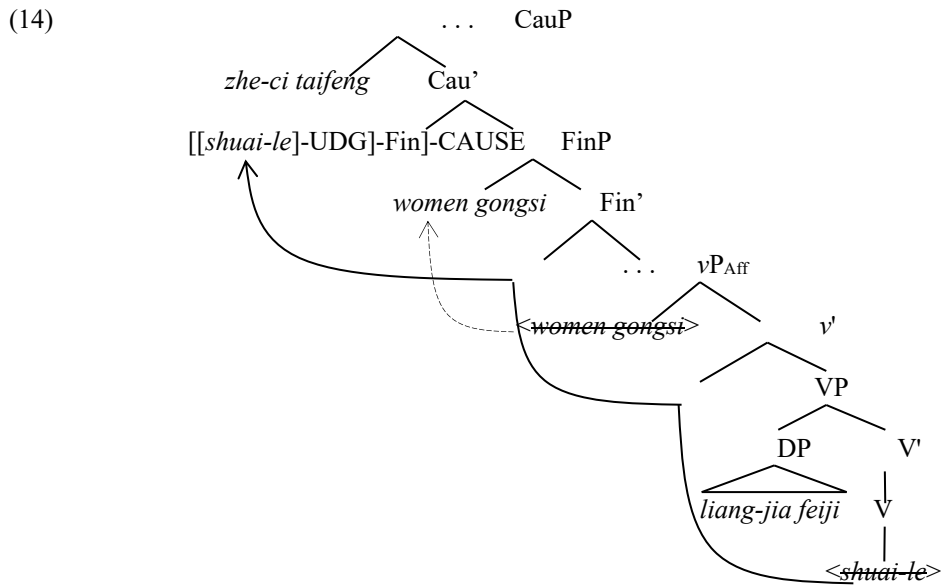
Now we can deal with a more complicated case involving eventuality causation such as (12): The sentence may well involve multiple light verbs in that it can be decomposed into a causal event and an affective event:

- (12) zhe-ci taifeng **shuai-le** women gongsi liang-jia feiji!  
*this-CL typhoon crash-PRF we company two-CL airplane*  
 ‘This typhoon caused the event that our company suffered from two airplanes crashing.’  
 這次颱風摔了我們公司兩架飛機！

On the technical side, the complex eventuality interpretation in question suggests that there is yet another layer of causative light verb projection on top of UDG, as evidenced by the following paraphrase of (12) with a lexical causative light verb *rang* ‘cause’:

- (13) zhe-ci taifeng rang women gongsi shuai-le liang-jia feiji!  
*this-CL typhoon cause we company crash-PRF two-CL airplane*  
 ‘This typhoon caused the event that our company suffered from two airplanes crashing.’  
 這次颱風讓我們公司摔了兩架飛機！

As one might expect, once we substitute CAUSE for *rang*, a chain reaction of verb-raising is triggered all the way up from the first phase ( $vP_{Aff}$ ) to the second phase (CauP), resulting in the surface word order of (12), as illustrated below:



### 2.3 Further Consequences from the Outer Light Verb Analysis

In light of our findings, one may wonder whether there is an outer version of the affective light verb, either lexical or implicit. We would like to argue that the so-called long-passive sentence in the sense of Huang (1999) can be recast as an eventuality affective construction. From our point of view, the matrix passive verb *bei* ‘cover, by’ in (15) actually functions as an outer affective light verb in the left periphery:

- (15) Akiu bei [wo tijin-le san qiu].  
*Akiu BEI I kick.in-PRF three ball*  
 ‘Akiu underwent the event that I scored three goals.’  
 阿Q 被我踢進了三個球。

In other words, we take (15) to be mono-clausal rather than bi-clausal, since *bei*, just like *rang*, is highly grammaticalized, and does not take any tense-aspectual inflection. Therefore, it is not unreasonable to suggest that *Akiu* is an Affectee occupying the Spec of AffP headed by *bei*, which in turn selects an event complement (presumably FinP), as sketched below:

- (16) [AffP *Akiu bei* [FinP *wo tijin-le san qiu*]].  
*Akiu BEI I kick.in-PRF three ball*

The difference is that *bei* does not have a silent counterpart like *rang* ‘cause, let’ has. As a result, no syntax-semantics mismatch is ever found with a hidden passive interpretation.

### 3. Implicit Causative Projection for Chinese Outer *Wh*-adverbials

#### 3.1 The Height of Interpretation for *Zenme(yang)*

Another revealing case for an implicit causative projection in the left periphery comes from the four types of *how*-construals laid out below:

- (17) *zhe-jian shi, ta chuli-de zenme.yang?*  
*this-CL matter he handle-RES how.manner*  
 ‘How (well) did he handle this matter?’ [resultative: predicate]  
 這件事，他處理得怎麼樣？
- (18) *zhe-jian shi, ta hui zenme(yang) chuli?*  
*this-CL matter he will how(manner) handle*  
 ‘How will he handle this matter?’ [instrumental: bare PP]  
 這件事，他怎麼(樣)處理？
- (19) *zhe-jian shi, ta zenme(\*yang) hui zhe.yang chuli?*  
*this-CL matter he how(manner) will this.manner handle*  
 ‘How come he would handle this matter in such a manner?’ [causal: adverb]  
 這件事，他怎麼(\*樣)會這樣處理？
- (20) *zhe-jian shi, zenme(\*yang) ta hui zhe.yang chuli?!*  
*this-CL matter how(manner) he will this.manner handle*  
 ‘How could he handle this matter in such a manner?!’ [disapproval: adverb]  
 ≈ ‘He shouldn’t handle this matter in such a manner!’  
 這件事，怎麼(\*樣)他會這樣處理?!

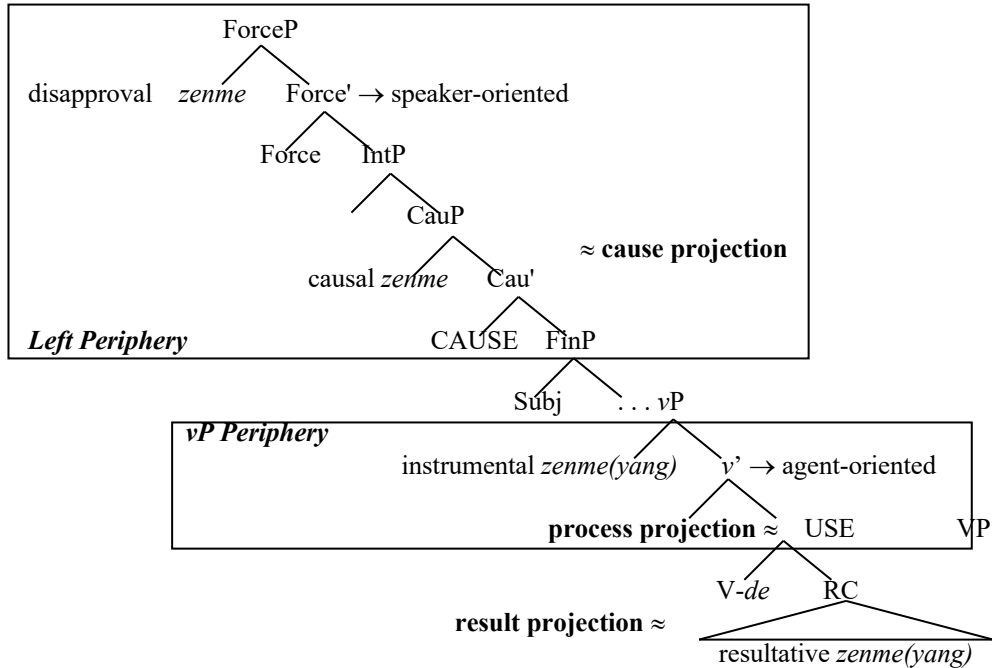
Similar to what we have seen with the causative light verbs, a coarse-grained hierarchy of Chinese *how*-construals has been stretched from the first phase (the *vP* domain) to the second phase (the *CP* domain):<sup>1</sup>

- (21) The height of interpretation for Chinese *how*-construals (>: c-command, scope over):  
 disapproval *how* > causal *how* > instrumental *how* > resultative *how*

This again demonstrates that the cause-process-result hierarchy in Ramchand’s (2008) sense has been implemented on a sentential scale due to the robust analyticity of Chinese. We may visualize the “topography” of Chinese *how*-construals in the following tree diagram (cf. adapted from Tsai 2015):

<sup>1</sup> See also Umbach, Hinterwimmer, and Gust (2022) for a formal semantic account of a very similar hierarchical arrangement of *wie* ‘how’ in German.

- (22) Topography of *zenme(yang)* along the clausal spine  
(RC: resultative clause)



Even more interestingly, the disapproval *how*-construal very often carries a mirative flavor (cf. Tsai and Yang 2022). This indicates a breakdown of the causal-effect relation in question. Take (20) for instance, there is a conflict between the at-issue content “he handled this matter in such a manner” and the speaker’s expectation “he should handle this matter in an acceptable manner” (i.e., the non-at-issue content, cf. Tsai 2022). The force in question thus shifts from interrogative to disapproval, with the implicature that he shouldn’t handle this matter in such a manner.

An often overlooked aspect of the above picture comes to light when we combine a non-agentive subject with an inner *how*-adverbial, as in (23):

- (23) tianli shi **zenme(yang)** zhang-chu zacao de?  
*field.in be how(manner) grow-out weed DE*  
 ‘How is it that weeds grew in the field?’ [process/way]  
 田裡是怎麼(樣)長出雜草的?

What is expressed here is “the process/way by which weeds grew in the field”, which suggests that there is a gray area between the left periphery and the *vP* periphery: On the one hand, it is impossible for *zenme(yang)* ‘how(manner)’ to be interpreted as instrumental, since the construal is in no way agent-oriented. On the other, *zenme(yang)* is under the cleft-focus (i.e., within the scope of *shi* ‘be’), and cannot be construed as causal, either. We take this to be a solid piece of evidence for the gradual path of grammaticalization from the comitativity of the *vP* periphery to the causality of the left periphery (cf. Tsai 2019). This in turn accounts for the “stretching effects” of the cause-process-result hierarchy observed across languages.

### 3.2 Three Types of Causation

Another issue to explore has to do with the following three types of (perception-driven) causal relations first studied by Shen (1985) and Reinhart (2003):

- I. X **Causes** Y if X is the sufficient condition (or biconditional) to Y.
- II. X **Enables** Y if X is an external event which is a necessary condition to Y.
- III. X **Motivates** Y if X is the mental state which is a necessary condition to Y.

In view of the causality hierarchy explored so far, it would be interesting to see how the three-way distinction can be accommodated in cartographic terms along our line of investigation. First of all, the Cause relation is relatively straightforward: *how come* questions in English and causal *zenme* questions in Chinese seem to fit the description quite well.

At the other end of causality, a purpose *why* like *wei(-le) shenme* ‘for what’ in (24) best embodies the Motivate relation, since it occupies a post-modal position (i.e., being scoped over by a modal), and is typically agent-oriented. In other words, the subject by definition has to be a sentient being with a mental state.

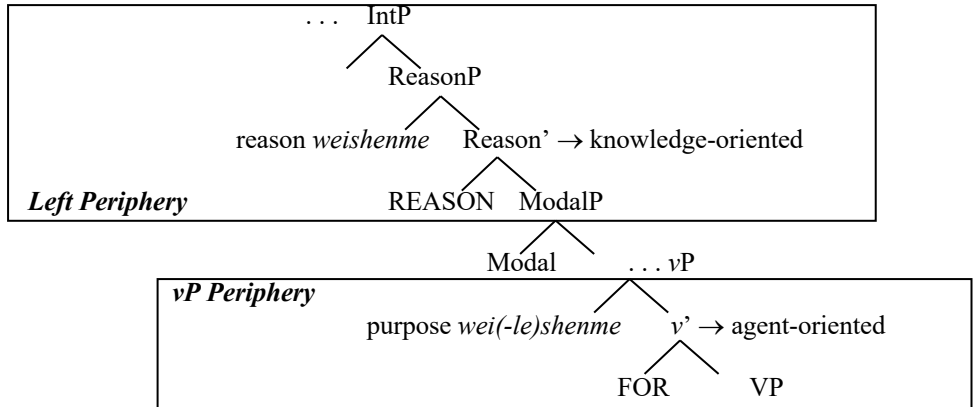
- (24) renmen hui **wei(-le) shenme** tingerzouxian?  
*people will for(-LE) what take.a.risk*  
 ‘For what (purpose) will people take a risk?’ [purpose: PP]  
 人們會為(了)什麼鋌而走險？

By contrast, a reason *why* such as *weishenme* in (25) best instantiates the Enable relation, as it questions the epistemic state of the at-issue content, namely, the reason that opens the possibility of suicide:

- (25) renmen **weishenme** hui zishao?  
*people why will self.kill*  
 ‘Why would people kill themselves?’ [reason: adverb]  
 人們為什麼會自殺？

In syntactic terms, *weishenme* occupies a pre-modal position (i.e., scoping over a modal), and is hosted by ReasonP in the left periphery according to Shlonsky and Soare (2011). It is thus possible to map out the inner-outer dichotomy of Chinese *why*-construals in the following manner:

- (26) Topography of *wei(-le)shenme* along the clausal spine



We may also draw cross-linguistic support from the two distinct types of *why*-questions in Russian, i.e., *počemu*, a reason *why*, vs. a purpose *why*, *začem*. While it is possible for *počemu* ‘why<sup>R</sup>’ to appear above the negation *ne*, as in (27a), *začem* ‘why<sup>P</sup>’ is blocked from the same position, as in (27b) (cf. Stepanov and Tsai 2008):

- (27) a. **počemu** vy **ne** skazali mne ob etom?  
*why<sup>R</sup> you not said me.DAT about this*  
 ‘For what reason didn’t you tell me about this?’
- b. \* **začem** vy **ne** skazali mne ob etom?  
*why<sup>P</sup> you not said. me.DAT about this*  
 ‘For what purpose didn’t you tell me about this?’

Interestingly enough, their distribution is exactly the opposite under the scope of negation: As shown in (28b), *začem* ‘why<sup>P</sup>’ can be interpreted as indefinite (i.e., for no purpose) in association with *ne-*. By contrast, the same construal (i.e., for no reason) is blocked for *počemu* ‘why<sup>R</sup>’, as evidenced by (28a):

- (28) a. \* mne **ne-počemu** tuda xodit’.  
*me.DAT not-why<sup>R</sup> there to.go*  
 ‘I have no reason in going there’
- b. mne **ne-začem** tuda xodit’.  
*me.DAT not-why<sup>P</sup> there to.go*  
 ‘I have no purpose in going there’

A further typological comparison can be made with the distinction between *nani-de* ‘what-with’ and its contracted form *nande* ‘how, why’ in Japanese: While the former allows only an instrumental reading, the latter can be construed as either instrumental or reason. As pointed out by Fujii, Takita, Yang, and Tsai (2014), a sentential adverbial such as *kanarazu* ‘necessarily’ may serve as a delimiter separating an inner *wh*-adverbial such as *nani-de* from an outer *wh*-adverbial such as *nande-mata* ‘why-on.earth’. Being construed as instrumental, *nani-de* must merge below the modal adverb *kanarazu*, as in (29), whereas *nande-mata* must merge above the modal adverb, presumably to the left periphery, as in (30):

- (29) Hiroshi-wa **kanarazu nani-de** okayu-o taberu-no?  
*Hiroshi-TOP necessarily what-with rice.congee-ACC eat-Q*  
 ‘With what does Hiroshi necessarily eat rice congee?’ [instrumental]
- (30) Hiroshi-wa **nande-mata kanarazu** okayu-o taberu-no?  
*Hiroshi-TOP why-on.earth necessarily rice.congee-ACC eat-Q*  
 ‘Why on earth does Hiroshi necessarily eat rice congee?’ [reason]

Similar construals can be found in Ancient Chinese, namely, *yi he* ‘with what’ vs. *he yi* ‘what with’: The former is construed as instrumental, while the latter is construed as causal or reason (EXC is exclamatory):

- (31) **yi he** de mian yu ci zai?  
*with what get spared to this EXC*  
 ‘With what do (I) get spared this?’  
 以何得免於此哉？ 《太平經》
- (32) qi mian **he yi** han?  
*you face what with sweat*  
 ‘How come your face is sweating?’  
 卿面何以汗？ 《世說新語》

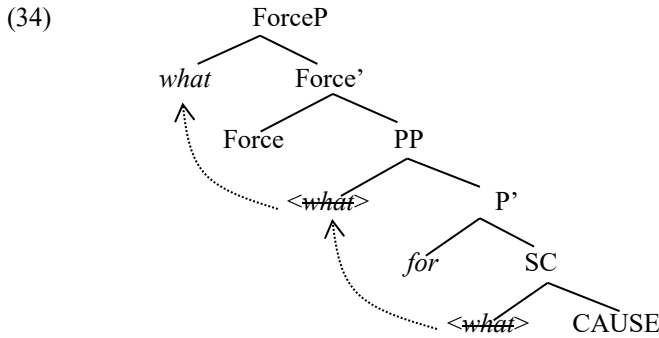
Furthermore, English short questions provide an interesting case parallel to the above alternation: at least for some speakers, the inversion of *what* over *for* (with a sharp downward intonation) triggers a peripheral construal such as mirative or disapproval, expressing some form of refutory attitude, as in (33b).<sup>2</sup> By contrast, (33a) remains neutral with a purpose or reason reading:

<sup>2</sup> Interestingly, the peripheral construal may also have a conceptual connection with the distinction between the following two *what ... for* constructions: (footnote continues on next page)



- (33) a. For what? [purpose, reason]  
 b. What for?! [mirative, disapproval]

As a working hypothesis, we propose that the *what for* question involves a silent component of causality, starting with the basic structure [PP *for what* CAUSE], followed by *wh*-movement to the Spec of ForceP, as sketched below:<sup>3</sup>



### 3.3 How as a factive/eventive complementizer

In the recent literature, there is a growing interest in the sentential/higher-order construals of *how*-expressions across languages. As noted by Legate (2010), English *how* can be used as a complementizer. It merges directly to the CP layer, hence scoping over a proposition, a near equivalent to *that*:

- (35) They told me how the tooth fairy doesn't really exist.  
 ≈ They told me that the tooth fairy doesn't really exist.

Here the height of interpretation blocks the potential adjunct usages, while ensuring that a reading like “the way it is” is in place. Liefke (2021) further distinguishes the above factive usage of *how* from an eventive usage of *how* such as (36) in the left periphery (see also Nye 2013; Umbach, Hinterwimmer, and Gust 2022):

- (36) Anna remembers [how Berta was packing her bag]  
 ≈ Anna remembers [a (specific) event in which ... ]

Both present a clear departure from the typical manner construal of *how* in the *vP* periphery (though, unlike Chinese, we cannot see the structural distinction due to obligatory *wh*-movement), as illustrated below:

- (37) Anna remembers [how Berta was packing her bag]  
 ≈ Anna remembers [the manner in which ... ]

Although it is difficult to find a straightforward counterpart of factive/eventive *how* in the plethora of usages of *zenme* in colloquial Chinese, the following higher-order construals of *ruhe* ‘how, like what’ in written Chinese seems to fill the gap:

- 
- (i) a. **What** can I do **for** you?  
 b. **What** can I do you **for**?

Some speakers take (ia) and (ib) to mean virtually the same thing, with the latter being asked jokingly as a wordplay, for example, by a bartender. However, some speakers think that (ib) can be used with a negative connotation, even with an undertone of abusing or taking advantage of someone.

<sup>3</sup> This tentative treatment is inspired by Leu’s (2018: 22) cartographic analysis of *was für* ‘what for, what kind of’ in German, where *was* ‘what’ raises to the top layer of the fine structure of PP from the base structure [*für* [SC *was* SORT]].

- (38) ta zhenqie kandao [ruhe yige chengshi bei dupin cuihui].  
*he clearly see how one city BEI drug destroy*  
 ‘He clearly sees how a city is being destroyed by drugs.’  
 他真切看到如何一個城市被毒品摧毀。
- (39) ta renshidao [ruhe ren hui yibubu wuruqitu].  
*he recognize how people will step.by.step go astray*  
 ‘He recognizes how people will go astray step by step.’  
 他認識到如何人會一步步誤入歧途。

From our point of view, the eventive vs. manner distinction has indeed to do with the height of interpretation. Namely, eventive *how*, just like factive *how*, merges directly to the left periphery. It follows that *ruhe* ‘how’ in (38) and (39) will never receive a manner reading since it merges too high above the vP periphery.

#### 4. Implicit Causative Projection for Chinese Reflexive Adverbials

The last case for our quest of a loosely organized hierarchy of causality comes from a rather unexpected source of causative construals, namely, Chinese reflexive adverbials situated in the left periphery. Tsai (2019) points out that there is an often overlooked conceptual connection between outer *how* and outer *self* in Chinese: As we have already seen in (40) ((19) repeated here), *zenme* ‘how’ precedes the modal *hui* ‘will’, questioning the cause of his handling this matter in such a manner.

- (40) zhe-jian shi, ta **zenme hui** zhe.yang chuli?  
*this-CL matter he how will this.manner handle*  
 ‘How come he would handle this matter in such a manner?’ [causal]  
 這件事，他怎麼會這樣處理？

Now consider outer *ziji* ‘self’ in (41): It also occupies a premodal adverbial position, asserting that there is no external cause for his handling of this matter: In other words, he will handle this matter without others’ coercion or persuasion. It is in this sense that we call this type of usage anti-causal.

- (41) zhe-jian shi, ta **ziji hui** chuli.  
*this-CL matter he self will handle*  
 ‘He will handle this matter on his own initiative.’ [anti-causal]  
 這件事，他自己會處理。

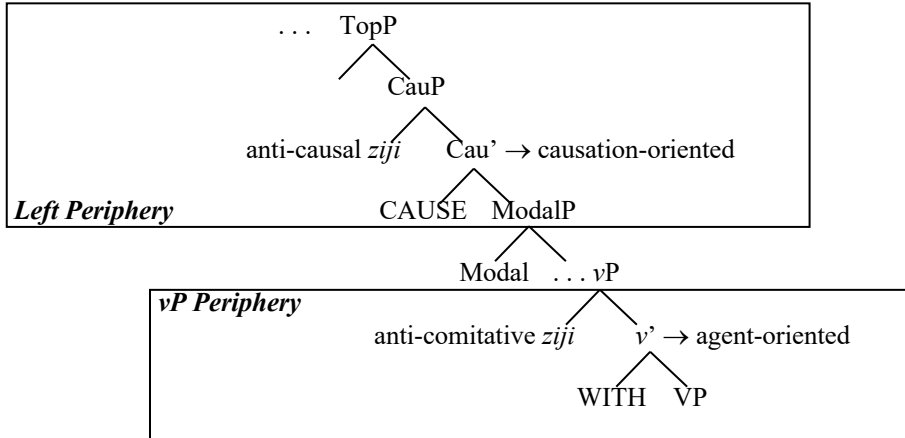
As a matter of fact, there is also a conceptual connection between inner *how* and inner *self* in the vP periphery. As shown in (42) ((18) repeated here), the postmodal *zenme* ‘how’ is interpreted as an instrumental question, expressing a comitative relation with the handling event. More specifically, we may well take this to encode a *with*-relation between an instrument argument and an implicit event argument in the sense of Parsons (1995):

- (42) zhe-jian shi, ta **hui zenme** chuli?  
*this-CL matter he will how handle*  
 ‘How will he handle this matter?’ [instrumental/comitative]  
 這件事，他會怎麼處理？

In parallel, inner *ziji* ‘self’ in (43) occupies a postmodal adverbial position, asserting that he will handle this matter without others’ help or company. We may therefore characterize this type of reflexive adverbial as anti-comitative:

- (43) zhe-jian shi, ta **hui ziji** chuli.  
*this-CL matter he will self handle*  
 ‘He will handle this matter alone/by himself.’ [anti-comitative]  
 這件事，他會自己處理。

(44) Topography of *ziji* along the clausal spine

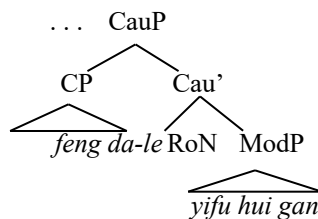


Finally, as extensively discussed in Tsai (2019), a cause-effect relationship can be established through the so-called “reflexive of nature”, as exemplified below (INC is inchoative):

- (45) feng da-le, men **ziji** hui kai.  
*wind big-INC door self will open*  
 ‘When wind grows stronger, the door naturally will open.’  
 風大了，門自己會開。
- (46) gua-chuqu, yifu **ziji** hui gan.  
*hang-outside clothes self will dry*  
 ‘Being hung outside, the clothes will become dry naturally.’  
 掛出去，衣服自己會乾。

Here adverbial *ziji* functions as a causative predicate linking an external event (i.e. hanging the clothes outside) to the main event at issue (i.e., the clothes become dry). Its function is essentially to predicate the effect event upon the cause event, as sketched below:

(47) Topography of *ziji* as Reflexive of Nature (RoN)



5. Concluding Remarks

All our discussions surrounding the three types of implicit causative projection point to the conclusion that there are many facets of the endeavor of encoding causality in cartographic terms. Moreover, elaborate considerations are needed to capture their ontological and grammatical properties through the syntax-pragmatics interface. We show that a loosely organized hierarchy of causality can best account for a variety of syntax-semantics mismatches through the postulation of a silent causative light verb CAUSE in the left periphery. The same analysis carries over to the distribution-interpretation correspondences of Chinese *how*-construals, as laid out in the following hierarchical arrangement according to their height of interpretation:

disapproval *how* > causal *how* > instrumental *how* > resultative *how*

In addition, the inner-outer dichotomy between causal *how* and instrumental *how* is in perfect alignment with that between anti-causal *self* and anti-comitative *self*. Our position is further strengthened by the explicit eventuality causation licensed by the reflexive of nature. Hopefully, this line of inquiry will lay grounds for our project of syntacticizing causality, and provide the morpho-syntactic backbone for semantic composition and pragmatic inference under the cartographic approach.

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