

Scalarity at the syntax-semantics interface (SYSSI)

Daniel Hole, Universität Stuttgart

Project Description

1 Starting Point

The planned project aims to shed more light on the syntax and semantics of *scalarity*, a notion that figures prominently in a wide range of linguistic works on very diverse languages. We take this pervasiveness in linguistic theory to be paralleled by one in human cognition, where scalarity appears to be of utmost importance. Scalarity has been conventionalized in various ways, giving rise to a diversity of scalar subphenomena in natural language. We will focus on a rather large, though clearly delineated subset of these, and the way different modules interact in bringing them about, most importantly syntax, semantics, and pragmatics. The work we will conduct is broadly defined by, but not limited to, scalar particles like ‘even’ and ‘only’ across languages and their appearance in context. The crosslinguistic perspective we take mainly includes contrasts and similarities between Chinese, English and German (with occasional excursions to Vietnamese), allowing us to cover an unprecedented breadth of – often novel – data simultaneously and develop crosslinguistically valid, though parsimonious, analyses. To the best of our knowledge, scalarity has never been scrutinized at such a general, all-encompassing level.

State of the art and preliminary work

The notion of scalarity is highly pervasive in the analyses dedicated to a variety of linguistic phenomena as diverse as degree constructions (Beck 2011), scalar particles like ‘even’ and ‘only’ (Beaver & Clark 2008; Gast & van der Auwera 2011; Guerzoni 2003; Grosz 2012), negative polarity items (NPIs; Israel 1997, 2001), and even desire predicates including ‘want’ (Heim 1992, Villalta 2008), among possible others. Scalar particles will play a major role throughout this project. They are sometimes, but not only, taken to be *focus-sensitive*. Zimmermann & Onea (2011) identify exclusive particles like ‘only’ as the clearest category, but Beck (2020), for example, takes the scalar particle ‘still’ to be discourse-anaphoric rather than focus-sensitive; see also Grosz (2012) on ‘already’. (1) and (2) are examples involving scalar particles:

- (1) a. [Just the thought of food] makes me hungry. Coppock & Beaver (2014)
 ~> the thought of food ranks low on a scale of sensual exposure to food
 b. [Già la sua faccia] mi piace poco. Hansen & Strudsholm (2008)
 [already DET his face] me pleases little
 ≈ ‘I already don’t like his very face.’
 ~> his face ranks low on a scale of exposure to him

(1) illustrates *minimal sufficiency* uses of subject-internal scalar particles in English and Italian, along with approximating paraphrases introduced by a ‘~>’ for ‘implies’.¹ (1a) involves the (otherwise) exclusive particle *just*, (1b) Italian *già* ‘already’.

‘Already’-particles like *già* in (1b) have prominent temporal uses in which they convey earliness. Earliness can be construed as lowness on a temporal scale. An illustration is given in (2), which pairs the Chinese ‘already’-particle *jiu* with its German counterpart *schon*.

- (2) a. Lisi SAN-DIAN **jiu** zai bangongshi le.
 Lisi THREE-O’CLOCK **JIU** at office ASP
 ‘Lisi was at the office as early as three.’ cf. Lai (1999): (1b)
 b. Hans war **schon** um DREI im Büro.
 Hans was **already** at THREE at.the office
 ~> three o’clock ranks low on a temporal scale (= is early)

¹ The term *minimal sufficiency* was coined by Grosz (2012). Cases like (1) are also discussed by Coppock & Lindahl (2014) and Panizza & Sudo (2020).

In (1) and (2), a scale is implicitly taken for granted. What the notion's pervasiveness suggests is that a core concept of human cognition (scalarity) has been conventionalized in various ways. More often than not, the scale at play is semantically underspecified, and remains to be contextually specified. A gradable predicate like *long* alternately operates on the scale of temporal intervals or spatial distances (Beck 2011). Grosz (2012) proposes an exclamative operator EX which operates on "a contextually salient scale". And (1b) and (2) together lend some support to an analysis of 'already' in terms of an underspecified scalar lowness (Lai 1999, Liu 2017 on *jiu*; von Stechow 2006 *pace* Krifka 2000; Wimmer 2020 on *schon*). Other specifications of *jiu*'s lowness proposed in the literature include easiness (Liu 2017) or spatial nearness (Tham 2005, Liu & Wang 2021). As can already be seen from the above examples, scalar underspecification is crosslinguistically widespread. To provide another example from an East-Asian language: Wimmer & Oda (2022) argue that concessive vs. counterfactual readings of the Japanese particle *noni* 'although' alternately operate on scales of likelihood or desirability.

Contextual specification of a relevant scale is a case of pragmatic enrichment. But there is at least one other sense in which a scalar semantics may interact with the pragmatics: Israel (1997, 2001) ties the semantics of scalar expressions like negative polarity items (NPIs) and 'already' to a grammaticalized expressive function bridging semantics and pragmatics. One of the two functions he distinguishes is *emphaticity*: for example, the temporal earliness conveyed by 'already' is seen as serving to make the informationally strongest statement possible. Strengthening is often achieved by the use of so-called *minimizers* in scale-reversing environments: expressions encoding scalar *lowness* such as the strong NPI *to lift a finger*. In a parallel fashion, Grosz (2012) endows what he calls 'optative *only*' with a scalar *lowness* semantics, which under his view is pragmatically exploited to convey a *strong* emotion on the side of the speaker: in fact, the optative *If only it were snowing!* wouldn't be an optative if it weren't for the *only* it contains (*??If it were snowing!*).

Scalar subnotions. The scalar variety opened up by scalar underspecification points towards a variety of scalar notions that is more or less explicitly being assumed in the literature. Table 1 below constitutes an attempt at a taxonomy of these different notions, along with their proponents and the phenomena they have been applied to.²

The first row stands for what Alonso-Ovalle & Hirsch (2018) call **contextual scales**: the contextual specification of an underspecified scale. Building on previous insights, Krifka (2000) characterizes German *schon* 'already' and *noch* 'still' as *scale alignment-particles*, where the scale may be temporal, spatial, or size-related. Contextual specification is also crucial in Lai's (1999) analysis of Chinese *cai* 'only; not ... until' and *jiu* 'already', where cases involving a temporal scale are seen as the most basic ones, and in Beck's (2020) analysis of *still* and its German counterpart *noch*. Finally, Beaver & Clark (2008) and Coppock & Beaver (2014) propose scalar analyses of exclusive particles like *only*, a line of approach in the tradition of Jacobs (1983); scalar ranking by logical entailment is argued to be insufficient to capture the full range of data. The *minimal sufficiency* examples in (1) may support such a scalar view. Another case put forth by Coppock & Beaver (2014) are *rank-order* readings as in *John is only/just a grad student*. Israel (1997, 2001) evokes the notion of *informational strength* to describe the pragmatic function of scalar terms. It is defined in terms of the additive inferences a scalar term licenses; see also Kay (1990) on *even* or Beck & Rullmann (1999) on scalar predicates in questions.

² It should be noted that the table is nowhere near an exhaustive literature review; there is no clear-cut separation of the scalar notions varying from row to row, nor are the authors cited necessarily associated with only one notion. Cases of multiple association are marked with an *.

Scalar notion	Author(s)	Phenomenon	
contextual	Lai 1999 [temporal, entailment, ...]	Mandarin <i>jiu & cai</i>	
	Krifka 2000 [time, spatial, ...]	German <i>noch & schon</i>	
	Beck 2020 [temporal, spatial, ...]	<i>still & noch</i>	
	Beaver & Clark 2008, Coppock & Beaver 2014	<i>only</i>	
	Alonso-Ovalle & Hirsch 2018 [spatial, ...]	[silent] AT LEAST	
	Greenberg 2017 [success, height, ...]	<i>even</i>	
	Wimmer & Oda 2022 [likelihood vs desirability]	Japanese <i>noni</i>	
	entailment		
logical		[Rooth 1992] [von Fintel 1997] (Beck & Rullmann 1999)	<i>only</i>
pragmatic	Kay 1990 *Israel 1997, 2001	<i>even</i> NPI-based inferences	
evaluation			
	MAX (unlikelihood /noteworthiness)	Karttunen & Peters 1979 Guerzoni 2003 Crnič 2011, 2012	<i>even</i> <i>even (& only)</i>
	MIN	[Alxatib 2013] Grosz 2012	<i>only</i>
	BAD	Hole 2015	<i>only</i>
	HIGH [emphatic]	Hole 2004, 2017 *Israel 1997, 2001 Grosz 2012	pragmatics of NPIs, ... optatives: EX
desirability			
		Heim 1992 Villalta 2008 Kratzer 1991, ... Sode 2018	<i>want, wish, glad, ...</i> modals in general modal <i>good</i>

These inferences are closely related to, yet still to be distinguished from strict **logical entailment**, so they are classified as **pragmatic entailment** in the second row of the table. The examples in (1) and (2) all license additive, yet not strictly logical inferences from lower to higher scalar values very much akin to those triggered by *even* (Rullmann 1997): if the mere thought of food makes the speaker hungry, then so will the sight or the smell of it, which rank higher on a scale of exposure; if x was at the office as early as three, then x is readily inferred to have been there at all later times within a plausible time span, where lateness is construed as highness on a temporal scale. Next, there are what we call **evaluative** (or *mirative*) scales here.

Table 1: Scalar subnotions in previous work

Scales ranking propositions according to **unlikelihood or noteworthiness** figure prominently in the vast literature on *even*, at least since Karttunen & Peters (1979). On such analyses, *even* ranks its *prejacent* (the proposition denoted by the sentence it is surrounded by) high(est) on an unlikelihood-scale (MAX), compared to its contextually salient alternatives; for a recent revision, see Greenberg (2017), who argues for *even*'s scalar underspecification. An interesting connection between likelihood and entailment is stated by Crnič (2011): if q is more likely than p, q cannot entail p. *Only* sometimes conveys an evaluation of *scalar minimality* or *insignificance* (MIN), but cf. Greenberg (2019) for counter-arguments. Hole (2015) argues that the object of evaluation is not the *prejacent* of *only* itself, but the asserted exclusion of alternatives. He also adds the evaluative notion of *badness* to *only*'s expressive range. In cases motivating this extension, *only* associates with *because*- and purpose clauses: there can be bad reasons or purposes, but no bad *conditions* (at least not in the relevant sense). The notion that all these evaluative scales probably fall under is Israel's (1997, 2001) emphaticity: an extreme value on a speaker-related scale, no matter if high (MAX) or low (MIN) on the evaluative scale at hand. Emphaticity plausibly includes Grosz's (2012) EX, a silent exclamative operator posited for the logical forms of optative constructions like *If only it were snowing!*

As mentioned above, a scale of comparative **desirability** is frequently assumed for desire predicates such as *want* (Heim 1992, Villalta 2008), yet also for modal uses of the evaluative predicate *good* as in *It would be good if the moon were shining* (Sode 2018). In Kratzer's (1991) modal semantics, desirability figures as one of several ways of ranking possible worlds according to a set of ideals contained in what she calls the *ordering source*. This concludes the overview of scalar subnotions. We now turn to more specific issues related to scalarity.

The conventionalization of scalarity may mean lexical encapsulation with other related notions. It may, however, also mean **syntacticization**. The semantic literature abounds with certain scalar operators hypothesized to be inserted at the level of Logical Form (Krifka's 1995 operators 'Scalar/Emphatic Assert', von Stechow's (1984) POS-operator, Crnič's (2011) AT LEAST etc.). Another step in this direction is taken by Hole (2015, 2017), who posits a potentially universal *scalarity projection* above T. This phrase is headed by operators that agree with semantically vacuous ad-focus particles, which may be phonetically realized under certain conditions. On such a view, scalarity has shaped the clausal architecture of natural language, which opens up a rich field of crosslinguistic investigation; cf. Z. Yang (2020) on Mandarin *ye* 'also'.

In laying out his scalar syntax, Hole (2015) focuses on *only*-sentences, where scalarity figures as one of two evaluative categories: scalar *minimality* ('this isn't much') or *badness*. A sentence like *She only ate three_F apples* typically conveys that the number of apples eaten is low, and this may be ascribed to a scalar operator MIN. In addition, there is the *exclusive* inference that no more than three apples were eaten, which can be ascribed to an operator EXCL. An innovative claim made by Hole is that minimality and exclusiveness need to be scopally disentangled, such that MIN and EXCL occupy distinct syntactic positions: contrary to standard accounts, what is evaluated as low is not *only*'s prejacent *p* (that he ate three apples), but the exclusive inference that he ate *no more than* three – i.e. the *exhaustified* prejacent *p'*. As a result, minimality-inducing MIN scopes above EXCL, which applies to *p* before scalarity comes into play:

- (3) MIN [_{p'} EXCL [_p he ate 3_F apples]] ≈ Hole 2015
 EXCL(_p he ate 3_F apples) ~> he ate no more than 3 apples
 MIN(_{p'} EXCL(_p he ate 3_F apples)) ~> **it is little that** he ate no more than 3 apples
 => 'no more than 3 apples (eaten)' are **few**

This analysis, if correct, supports the existence of a dedicated scalar projection in the syntax, occupied by MIN in (3). The intricate details of the analysis are left aside here, but receive crosslinguistic support from languages such as Chinese, Vietnamese, and even German itself; for detailed discussion of the former two languages, see Hole (2017, 2023).

Minimality and evaluativity. Matters of scopetaking aside, the minimality-inferences of *only*-sentences tend to be regarded as evaluative or mirative, reflective of the speaker's subjective views on the (exhaustified) prejacent. This brings *only*'s scalarity into the vicinity of so-called expressive content. But *only*'s evaluativity is not undisputed: Greenberg (2019) persuasively argues in favor of a scalar semantics put forth by Guerzoni (2003), but against also putting evaluativity into the semantics. A pertinent example is given in (4), where the prejacent involving the A- is low with respect to the only contextually salient alternative involving the A+, rather than ranking below the speaker's standard of desirability.

- (4) [Mary got an A+. John says:]
 I only got an A. I'm so happy! ≈ Greenberg (2019)

In the light of such examples, it may seem more plausible to see evaluativity as a pragmatic default instead: in the absence of overriding contextual factors, *only*-sentences convey a speaker-evaluation of the (exhaustified) prejacent as unexpectedly or undesirably little. This raises several questions: is the subjective evaluation just a specification of this semantically encoded presupposition? Should it better be put into a separate LF-ingredient such as Grosz's

(2012) exclamative operator EX, which he assumes for optatives containing ‘only’? Should it be treated as a presupposition, as would be standard, or rather as a *conventional implicature* instead? And what predicts the variation in evaluativity? Hole’s (2015) syntactic account does predict variability for some cases: the badness- and lowness-evaluations that ‘only’ often comes with may project syntactically, but frequently need not (or may not).

Minimality beyond ‘only’. Another potentially minimality-inducing element is German *schon* ‘already’. An analysis in terms of minimality is entertained by Liu (2017) for *jiu*, which can mean ‘only’ or ‘already’. It is also entertained by von Stechow (2006) for German *schon* ‘already’ and by Beck (2019). Krifka (2000) assumes the opposite: maximality rather than minimality, which likens *schon* to ‘even’. However, it can be shown that German *schon* ‘already’ and *selbst* ‘even’ are not always interchangeable in conditionals (Wimmer 2020):

- (5) a. {Selbst/Schon} wenn (nur) ein Tropfen fällt, bleibe ich daheim.
 {even/already} if (only) one drop falls stay I at.home
- b. {Selbst/#Schon} wenn es in Strömen regnet, gehe ich wandern.
 {even/already} if it in torrents rains go I hike

The (b)-variant doesn’t work with *schon*, which arguably requires its prejacent to rank low on a scale, and a torrential rain cannot plausibly be construed as minimal. In Israel’s (1997, 2001) system, *even* and *already* share the same emphatic function of making a maximally strong contribution to the conversation at hand, but differ in the semantic basis on which they do so, evoking scalar ends that are essentially opposed to each other (MIN and MAX).

Minimal sufficiency. Otherwise exclusive particles like English *just* may exhibit readings that Grosz (2012) calls *minimal sufficiency* (MS henceforth). Not only does the exclusive force appear to be lost in these cases (Liu 2016, 2017); MS has even been noted to have an *additive* component (Panizza & Sudo 2020), hence the plain contrary of exclusiveness. One is faced with the paradoxical situation that a given exclusive particle can have an additive effect, acting in pretty much the same way as a *minimizing* NPI (Guerzoni 2003). There are **mono-** and **bi-clausal** instances of MS, which can be illustrated as follows. In both cases, there are three relevant implications described by the subscripts MIN (for ‘minimality’), MAX’ (‘maximality’) and ADD (‘additivity’). MIN relates to the minimizing semantics of the exclusive and MAX’ to the overall sentence’s informational strength.

- (6) [Just the thought of food] makes me hungry. cf. Coppock & Beaver (2014)
 ~>MIN the thought (of food) ranks low on a scale of sensual exposure to food
 ~>MAX’ it is maximally unlikely that the (mere) thought makes the speaker hungry
 ~>ADD anything ‘higher than’ the thought makes the speaker hungry
- (7) [(Even) if only two_F cats come], Patrick will be happy. cf. Grosz (2012)
 ~>MIN two cats coming are low in number
 ~>MAX’ it is maximally unlikely that (as few as) two cats make Patrick happy
 ~>ADD any number of cats higher than two will make Patrick happy

Ex. (6) is repeated from (1). Ex. (7) is a conditional with an *only* in its antecedent clause. The overarching relationship is *verification*: in terms of membership in (6), and in terms of sub-sethood in (7), unless the conditional antecedent is treated as a definite description of worlds (Stalnaker 1968, Schlenker 2004 a.o.). Here are the schemata underlying the two examples:

- (6’) Monoclausal MS (even) [[just NP_F] VP]
 ~>MIN as little as [[NP]] verifies [[VP]]
 ~>ADD anything more than [[NP]] verifies [[VP]]
- (7’) Biclausal MS (even) [[if only p_F] q]
 ~>MIN as little as p verifies q
 ~>ADD anything more than p verifies q

To our knowledge, unified analyses of bi- and monoclausal MS are rare, with the exception of Coppock & Lindahl (2014). There is no consensus as to what conditions favor or even necessitate MS-readings of exclusive particles like English *just*, Chinese *guang* ‘alone’ and its German counterpart *allein*. It has been noted that the insertion of certain particles may disambiguate towards an MS-reading; see Grosz (2012) and Wimmer (2022) on biclausal cases, and Panizza & Sudo (2020), Stolterfoht & Hole (2020) [S&H] on monoclausal ones. The bracketed ‘even’ in (6’) and (7’) would be one such disambiguating particle; its additivity effectively rules out an exclusive reading. Interaction between an exclusive and a disambiguating particle presents an interesting challenge for compositional semantics. Some of it has been tackled by the authors just mentioned, but S&H also present monoclausal examples involving ‘alone’ where disambiguation proceeds into the exclusive direction:

- (8) Allein Betruhe kann hier {schon/noch} helfen.
 alone bedrest can here {already/still} help

Schon ‘already’ induces an MS-reading (‘bedrest alone can already help’), *noch* ‘still’ an exclusive reading (‘only bedrest can help at this point’). Both particles are additive, so additivity does not guarantee MS.

Scalarity and modality. There is a rising interest in a highly conventionalized kind of conditional that Kaufmann (2017) calls **conditional evaluative construction (CEC)** and which is of the form ‘if p, {good, bad}’. The consequent-part of a CEC boils down to an evaluative predicate. CECs are attested in Japanese (Kaufmann 2017, M. Yang 2020), Chinese (Hole 2004, 2006) and Korean (Chung 2019). As a whole, CECs denote modal claims involving the antecedent p: for example, ‘if p, good’ may express a desire for p. Kaufmann and Chung derive these modal meanings compositionally from a conditional semantics.

In the context of the present proposal, Chinese CECs as described in Hole (2004, 2006) are of particular interest as they involve the scalar particles *cai* ‘only’ and *jiu* ‘already’, which are highly frequent in ordinary conditionals as well:

- (9) a. [Ni yong xianqian mai] **cai** keyi ya!
 [you use cash buy] **CAI** okay PRT
 ‘You must use cash to buy it!’

- b. [Ni yong xianqian mai] **jiu** keyi le.
 [you use cash buy] **JIU** okay PRT
 ‘You can use cash to buy it.’

both ex.s from Hole (2004)

These sentences clearly make modal claims. But these modal claims vary with the scalar particle chosen in the consequent. Potentially non-trivial differences in the sentence-final particles aside, it hence matters whether we have ‘if p *jiu* good’ or ‘if p *cai* good’. A working hypothesis based on the above examples would be that the specific scalar semantics of *cai* and *jiu* regulates the *modal force* of the overall construction: *cai* induces *necessity*, *jiu* *sufficiency*.

But there are other parameters to be taken into account: the evaluative predicates chosen vary in interesting ways, and are hypothesized by Hole (2004) to encode different modal *flavors*. They can be bouletic (desire-related), deontic (rule-related) or teleological (goal-related), and may range within a type of modal super-flavor that Portner (2007) calls *priority modality*. There remains work to be done to pin these flavors down.

A further challenge comes from constructions of the form ‘(if) p, *jiu* good *le*’. These touch on the issue of *counterfactuality* in Chinese, which lacks dedicated verbal morphology to achieve this interpretive effect, but has certain construction-specific strategies (Jiang 2019). As laid out in Hole (2004), CECs of this kind have a strong bias to be interpreted as *optatives* (Grosz 2012): ‘if p *jiu* good *le*’ easily translates into ‘if only p!’ A *desire* for p is paired with *disbelief* in p’s *attainability* (von Fintel & Iatridou 2023). But they can also be interpreted as an *attainable* [i.e. *realistic*]

desire for p , or even as *gladness* in view of the (believed) truth of p . In other words, the speaker's epistemic state regarding p seems to be *semantically* underspecified, and remains to be specified *pragmatically*, the default being p 's believed falsity. A precise account of this epistemic variability (along with the counterfactual bias) remains to be given. Here too scalarity comes into play. The *only* in 'if only p ' and the *jiu* in 'if p *jiu* good *le*' might both be used to the same interpretive effect, as suggested in Wimmer (2020). However, CECs of the form 'if p *cai* good' also exist, hence have to be added to the picture as well.

2 Objectives and work programme

2.1 Anticipated total duration of the project

The anticipated total duration of the project is three years.

2.2 Objectives

We aim to shed new light on so far unresolved puzzles pertaining to scalarity in natural language, with a clear focus on explicit compositional analyses at the syntax-semantics interface and its additional intersection with pragmatics. Regarding the empirical basis, a crosslinguistic perspective will be pervasive throughout. Special attention will be paid to a comparison between English and German on the one hand and Mandarin Chinese on the other, complemented by an occasional consideration of Vietnamese. The typological unrelatedness of these (groups of) languages strikes us as highly beneficial for theory building in that similarities between them allow for a higher degree of generality in drawing crosslinguistic conclusions. In close collaboration with psycholinguists in Tübingen and in Stuttgart, we will strive for an empirical clarification of the more subtle data points. These psycholinguists include Prof. Dr. Judith Tonhauser, Prof. Dr. Titus von der Malsburg, Dr. Fabian Bross and Dr. des. Jun Chen here in Stuttgart, as well as Prof. Dr. Britta Stolterfoht from Tübingen.

There will be three **work packages (WPs)**; for each package, the researchers involved in it are mentioned in angular brackets, together with their degree of involvement as reflected by weekly hours (FB = Fabian Bross, JC = Jun Chen, DH = Daniel Hole, AW = Alexander Wimmer).

WP1: Unifying *minimal sufficiencies*. This WP covers bi- and monoclausal instances of *minimal sufficiency* (=MS; Grosz 2012), where the biclausal variants come as overt conditionals. We aim for a unified analysis of these two constructions, offering further insights into the factors favoring MS, and drawing comparisons between languages. [DH: 1.5h, FB: 2h, AW: 13h]

WP2: The scalar building blocks of complex modal expressions. We shed more light on the composition of *conditional evaluative constructions* (CECs, Kaufmann 2017, Chung 2019): conditionals of the form 'if p , q_{flavor} ' which transparently encode modal claims about the antecedent p , and whose consequent q_{flavor} arguably defines the *modal flavor*. Chinese CECs crucially include the scalar particles *cai* 'only; not until' and *jiu* 'already', whose contributions to the overall meaning we seek to pin down. [DH: 1.5h, JC: 1.5h, AW: 13h]

WP3: The taxonomy of Chinese scalar particles as a window onto universal scalarity. The goal of this WP is to offer a new unified view of the Chinese scalar particles *cai*, *jiu*, *dou* 'lit.: all' and *ye* 'lit.: also' (and also of certain minor particles belonging to the system, such as *hai* 'lit.: still' or *zai* 'lit.: once more'), tackling the differing interpretive effects they have in different syntactic constellations. We take this system to be a toy model allowing us to identify the ingredients for a universal syntax of sentences containing scalar particles, as recently argued for in a series of works. [DH: 1.5h, JC: 1.5h, AW: 13h]

2.3 Work programme including proposed research methods

We seek to tackle the work packages just sketched by providing in-depth theoretical investigations of the scalar phenomena at hand: formally explicit semantic and syntactic analyses. These analyses will be inspired by crosslinguistic comparisons, which they are intended to capture, with focus on the contrast between (Mandarin) Chinese and English/German, but will be partial-

ly based on Vietnamese and Japanese data as well. To gather data from the languages under investigation, especially from Mandarin Chinese, we will reach out to the native speaker consultants we have been in touch with in the past for our previous work. This will allow us to gain grammaticality and contextual felicity judgments, keeping in mind the considerable dialectal as well as idiolectal variation that Chinese is known for. Other data sources will include corpora, dictionaries and grammars. For German, we will to some extent rely on our native speaker intuitions. For some of the more subtle phenomena, we will collaborate with the psycholinguists mentioned above. The experimental methods will at least include *offline* acceptability judgment tasks, potentially also *online* methods like self-paced reading studies.

WP1 Unifying *minimal sufficiencies*

Working hypotheses

Mono- and biclausal *minimal sufficiency* [MS] both involve

- modalization

- a MIN-operator, which is spelled out as ‘already’ unless it is silent.

Biclausal MS for conditionals of the form *if only p, q* amounts to an absence of *conditional perfection*.

In this WP, we aim to offer a unified perspective on **mono-** and **biclausal** instances of ***minimal sufficiency (MS)*** readings involving otherwise exclusive scalar particles like English *just*. In line with previous work on the topic and a general tendency in compositional semantics, the overarching goal is to keep the semantics exclusive, and reduce the emergence of MS to contextual conditions. The WP’s main goals are (i) to offer new insights on these conditions, as well as (ii) to provide compositional analyses, in potential dependency on the insights gained from (i). Generality will be aimed for in two regards: (a) the aforementioned unification of mono- and biclausal cases; (b) by comparing the situations in different languages, namely English (Coppock & Beaver 2014), German (Grosz 2012; Wimmer 2022a) and Chinese (Liu 2017).

MS-favoring factors. One crucial MS-enforcing condition is the disambiguating insertion of certain **additive particles** (Grosz 2012, Panizza & Sudo 2020). This can be seen in the following examples, which invariably have an MS-reading, thanks to the underlined additive particles.

(10) a. Even just one_F cat will make Patrick happy. cf. Panizza & Sudo (2020)

b. Allein Betruhe kann hier schon helfen. Stolterfoht & Hole (2020)
alone bedrest can here already help

(11) {Schon/selbst/auch} wenn nur zwei_F Leute einsteigen, wird das Boot sinken.

{already/even/also} if only two_F ppl get.in will the boat sink

‘Even if only two people get in, the boat will (already) sink’ cf. Grosz (2012)

In the absence of the additives, the above sentences are in principle **ambiguous** between an *exclusive* and an MS-reading. We briefly concentrate on (11), which follows the biclausal pattern from above, i.e. [[if only p_F] q]. With the additives removed, the exclusive reading for (11) would be that a number of passengers *higher* than three might (or will) keep the boat from sinking. Plausibility disfavors such a reading, so an additive’s presence or absence doesn’t seem to make a big difference in the cases at hand; however, there are cases where the exclusive reading is the default, and where an additive is required to override it when an MS-reading is intended (Grosz 2012). Wimmer (2022a) links the exclusive reading to ***conditional perfection (CP)*** henceforth; Geis & Zwicky 1971, Horn 2000 a.o.): the pragmatic step from *if p, q* to *if & only if p, q*. Under this ‘reductionist’ view, which we seek to further explore in this work package, MS-readings for conditionals of the form *if only p, q* crucially lack a CP-reading. Additives enforce an MS-reading *by virtue of canceling CP*. The hypothesis to be further explored is that whenever

the conditional has an MS-reading despite the absence of an additive, that conditional lacks a CP-reading to begin with: whatever factors *disfavor* CP *favor* MS.

Regarding monoclausal cases of MS – sentences of the prototypical form [[just NP_F] VP] –, two rather recent writings identify the **sentence predicate** denoted by the VP as crucial for the presence or absence of an MS-reading: Coppock & Lindahl (2014), C&L henceforth, and Panizza & Sudo (2020), P&S, though this connection had already been established by König (1991). C&L observe contrasts roughly like the one in (12); the felicity of the *let alone* continuation serves as a diagnostic to identify MS.

(12) Just a cup of tea...

... will cure this illness, let alone two cups => MS

... was spilled that night, #let alone two cups => no MS

C&L arrive at the generalization in (13), which identifies *causation* as a crucial MS-enforcing factor.

(13) **Causativity Generalization**, Coppock & Lindahl (2014: 31)

NP-modifying *just* has a minimal sufficiency reading within a single clause when the NP plays a non-agentive causer role.

P&S (2020) also tie monoclausal MS to the sentence predicate P. Unlike C&L, who identify a *triggering* condition, P&S identify a *blocking* condition: P's *distributivity* is said to keep an MS-reading for *just* from arising.

Even if C&L's or P&S's generalizations should turn out to be accurate, we wish to put forth yet another MS-enforcing factor, which has the advantage of unifying bi- and monoclausal instances of MS: namely, the inference pattern Beck & Rullmann (1999) refer to as **upward scalarity**, and define for monoclausal environments as follows.

(14) **Upward Scalarity**, Beck & Rullmann (1999)

for all n, m: if P(n) & $n \leq m$, then P(m)

if P holds of n & n is scalarly lower than m, then P holds of m [as well]

(14) can be slightly reformulated for conditionals: the conditional consequent q now corresponds to the sentence predicate P, and the entities n and m correspond to two different antecedent propositions p and p', respectively. The step is all the more plausible insofar as conditionals, treated as *definite descriptions*, are themselves nothing but predicative structures, where the consequent q is ascribed to a unique [plurality of] world[s] denoted by the antecedent clause (Stalnaker 1968, Schlenker 2004, Kaufmann 2017 a.o.).

(15) **Upward Scalarity**, 'conditionalized'

for all p, p': if [if p, q] & $p \leq p'$, then [if p', q]

One might argue that the monotonicity pattern in (15) follows from the *downward monotonicity* of conditional(antecedent)s (von Stechow 1999 a.o.). But if we have an exclusive 'only' in the antecedent, we have overt *embedded exhaustification*. Embedded exhaustification, whether overt or covert, blocks downward monotonicity (Crnič 2012).

The ambiguity of 'only' between exclusive and MS-readings raises the question whether an exclusive semantics can be maintained for the exclusive at hand. Grosz (2012) ends up proposing a lexical ambiguity for 'only', distinguishing between an exclusive 'only' [ONLY₁] and a non-exclusive MS-'only' [ONLY₂]. He does so after ruling out the option that MS-'only' in cases like (9) is 'even'+ONLY₁, and casting doubt on the option that it is 'already'+ONLY₁. Panizza & Sudo (2020) [P&S henceforth] keep English *just* exclusive, reducing its MS-uses as in (8a) to the presence of a silent *even*-operator at Logical Form (LF). We side with P&S's goal of keeping 'only' exclusive, a position shared by Coppock & Beaver (2014) and Coppock & Lindahl (2014). However, we lean towards the involvement of '**already**' rather than 'even', favoring one of two views that Grosz (2012) is less skeptical about. This hypothesis remains to be substantiated.

More concretely, we hypothesize bi- and monoclausal MS to come with a MIN-operator at Logical Form, which may remain unpronounced. Its phonetic realization is ‘already’ and its language-specific variants, i.e. *jiu* in Chinese and *schon* in German. This is appealing for at least two reasons: first, German *schon* ‘already’ induces MS-readings, as could be seen in (9) above. This holds both for mono- and for biclausal cases. Second, the Chinese particle *jiu* ‘already’ exhibits a strikingly similar behavior. It figures prominently in both kinds of MS-constructions. And its presence may enforce an MS-reading. This is illustrated by (16) from Liu (2016). Despite the exclusive particle *zhi* ‘only’ preceding the focus, the sentence only has the nonexclusive MS-reading that something as little as corn yielded 500 kg. This effect is due to the postfocal presence of *jiu*.

- (16) Zhi yumi_F **jiu** shou le wubai gongjin.
 only corn_F **already** yield ASP 500 kg
 ‘Corn alone yielded 500 kg.’ ≈ Liu (2016)

In other words, there is crosslinguistic substance to the claim that MS comes from silent MIN. (For challenges raised by *jiu*, see the discussion below.)

The presence of MIN is one part of the analysis we aim for. The other is **implicit universal quantification**, which has the advantage of unifying both bi- and monoclausal MS: there is always a universal quantifier \forall involved at LF. For simplicity, MIN is omitted from the following representations.

- (17) $\forall(\text{only } p)(q)$ biclausal
 $\forall(\text{only } x)(Q)$ monoclausal

For conditionals, the presence of \forall is uncontroversial under the *restrictor view* (Kratzer 1986). For simple cases of predication, it is clearly less standard. Previous work on monoclausal MS derives MS-readings via type-shifting (Coppock & Beaver 2014 [C&B], P&S 2020) or via an assumed switch in the set of focus alternatives the exclusive particle operates on (Liu 2017). For a sentence like *Just the thought of food makes me hungry* C&B derive an existential (\exists) statement: ‘something _{\exists} that is not more than the thought of food makes me hungry’. To ensure sufficiency, it may seem more desirable to assume \forall -quantification; \exists -quantification leaves open the possibility that some food doesn’t make the speaker hungry. This potential weakness may be repairable within the type-shifting approach, but this would still come at the loss of a unified view tying both types of MS together.

Certain compositional questions remain to be answered: for one thing, it remains to be determined where MIN takes scope at LF: above the entire clause or just a part thereof. For another, and perhaps more crucially, the semantic type of the argument ‘only’ takes in each of the cases outlined in (17) remains to be determined. Under the approach taken in Hole (2015) and Quek & Hirsch (2017), ‘only’ always takes a proposition as its argument, contrary to syntactic appearance: MS would then always be an implicit conditional. Such a take is foreshadowed for similar data in Buring (2004). It would further reduce the two cases to the first of the two, but would also require additional assumptions about how two parts of the same clause – represented by ‘x’ and ‘Q’ in (17) – can each denote a proposition. Suggestive evidence for this view comes from Chinese examples like the following:

- (18) a. Guang **shi** xiang_F jiu ling ren haipa.
 alone **be** think_F JIU make people afraid
 ‘The very thought is scary.’ LINE Dictionary
 b. Lao Wang zhi-yao **shi** cha_F jiu he.
 Old Wang only-need **be** tea_F JIU drink
 ≈ ‘It only has to be tea for Old Wang to drink it.’

These may look like monoclausal cases. The involvement of *shi* ‘be’ indicates a hidden biclausal structure, however: ‘if x is only {the thought/tea}, then {x scares people/Old Wang drinks x}’.

Crosslinguistic comparison. Our hypothesis that MS always comes with MIN faces two potential challenges. The first one is that we want this operator to contribute *additivity*, seen above to be one crucial inference MS-constructions come with. (Under P&S’s account, MS-additivity comes from silent EVEN.) An additive semantics seems plausible for *already* or its German counterpart *schon* (Ippolito 2007, Beck 2020). But it would be a bigger step to build additivity into the semantics of Chinese *jiu*, especially if we consider its use in conditionals. In conditional consequent clauses, *jiu* is much more conventionalized than ‘already’. In conditionals of the form ‘if p, *jiu* q’, *jiu* is often translated as ‘then’, which is non-scalar and doesn’t license additive inferences (Iatridou 1993; Schlenker 2004; Wimmer & Liu t.a.). Taking this into account, Hole (2004) assumes an underlying polysemy to be at work. The following strikes us as a potential way of keeping *jiu* lexically unambiguous: the first step would be to say that the ‘then’-translation for the conditional variant masks its underlying scalar lowness (Wimmer 2020, Liu & Wang 2021). The second step would be to say that this scalarity licenses additive inferences to higher elements on the scale, following scalar reasoning processes that have been proposed (Rullmann 1997; Israel 1997, 2001).

A less challenging complication is *jiu*’s postfocal obligatoriness, induced by certain prefocal items. Sometimes *jiu* doesn’t seem to *induce* MS rather than just *reflecting* it. Subject-internal *guang* ‘alone’, for instance, can only have an MS-reading.

(19) Guang [zhe-jian shi]_F *(jiu) shuoming ta hen nenggan.
alone [this-CL thing]_F *(JIU) show she very capable

‘This thing alone shows that she’s very capable’ cf. Hole (2004)

Postfocal *jiu* does not play a disambiguating role in (19): the sentence would be plainly ungrammatical without it. So *guang* can be taken to realize MIN here. So does *jiu*, on our hypothesis, whose insertion is predicted to lead to a (harmless) redundancy; it is hence not predicted to be obligatory, contrary to fact. A syntactic enrichment of our account seems called for. Under Hole’s (2015, 2017) view, *guang* does not spell out, but syntactically agrees with MIN, realized as *jiu*. Chinese spells out both elements in such an agreement configuration, hence the obligatoriness.

Experimental investigation. To decide which of the two competing views on *prima facie* monoclausal MS-constructions is correct, i.e. whether such constructions are really monoclausal or underlyingly biclausal, we plan to conduct a psycholinguistic experiment using *structural priming*. In doing so, we will revisit S&H’s German contrasts from (8), repeated as (20):

(20) Allein Betruhe kann hier {schon/noch} helfen.
alone bedrest can here {already/still} help

As a reminder, *schon* enforces an MS-reading of *allein*, while *noch* enforces an exclusive reading. There is pervasive evidence that under exposure to two relevantly similar linguistic structures in succession, the first one significantly enhances the processing of the second, even if they do not share the same lexical material, meanings, metrical patterns, or language (see, for example, Loebell & Bock 2003; Pickering & Ferreira 2008; Tooley 2023 for overviews). Applied to the German cases from S&H, this leads to the following prediction: if structures with MS-enforcing *schon* are indeed implicit conditionals, while structures with *noch* are not, then if participants are primed with a regular conditional, this will speed up the processing of *schon*-clauses, while the same effect will not be observed with *noch*-clauses. To be more precise, participants will first be primed with a conditional structure, and then be presented with either a *noch*- or a *schon*-clause. In either case they have to decide whether or not that clause’s structure is well-formed. If *schon* clauses are implicit conditionals, this should speed up their deci-

sions in comparison to the *noch*-clauses. (Alternatively, a self-paced-reading task might be employed to receive more fine-grained measures.)

WP2 The scalar building blocks of complex modal expressions

Working hypotheses

Conditional evaluative constructions (CECs) of the form ‘if p, {MIN_{SCHON}, MIN_{ERST}} q_{flavor}’

- express ‘{may/must} p’, and
- q_{flavor} defines the modal *flavor*
- MIN_{SCHON} induces *possibility*
- MIN_{ERST} induces *necessity*

In the wake of Kaufmann (2017), there is an increasing interest in **conditional evaluative constructions (CECs)** in Japanese (M. Yang 2020) and Korean (Chung 2019). All these constructions follow the (simplified) pattern ‘if p, q_{flavor}’, where q_{flavor} is an evaluative predicate like ‘good’, and the subscript ‘flavor’ reflects Hole’s hypothesis that these predicates encode a specific modal flavor. Our aim is to provide an in-depth investigation of CECs in Chinese: their compositional semantics and pragmatics. Our starting point will be Hole (2004), who systematically describes a variety of Chinese CECs. (The Japanese CECs discussed by Kaufmann include more complex consequents like *naranai* ‘it doesn’t work’; we set these cases aside for the time being, but they will of course gain importance, should they turn out to be attested in Chinese as well.) According to this description, there are two main sources of variation: (i) the consequent q_{flavor} and (ii) the particle contained by or preceding q_{flavor}: the scalar particles *cai* ‘only; not until’ and *jiu* ‘already; then’, which are typical of Chinese conditionals and which we take to instantiate the operators MIN_{ERST} and MIN_{SCHON}, respectively, for reasons that will become clear below. A crucial component of this WP will be a detailed account of how these building blocks compositionally interact to result in the modal claims CECs conventionally express. This continues a strand of recent work which takes CEC-like configurations to shed light on the logical architecture of modal expressions like ‘want’ or ‘should’, which tend to be realized as portmanteau morphemes in English and German. More specifically, the involvement of scalar *cai* and *jiu* constitutes a bridge to *graded modality* (Kratzer 1991, Lassiter 2017). The analyses will build on the already existing ones, including the assumption that the CEC-consequent q_{flavor} denotes a “predicate of worlds” (Sode 2018, Kaufmann 2017).

A construction that deserves attention and which we will take to be prototypical of Chinese CECs as a whole are *bouletic* (desire-related) or *optative* CECs of the form ‘if p, then good’:

(21) Yu ting xia jiu hao le!
rain stop fall JIU good ASP

‘If only it stopped raining!’ Wimmer (2020)

(21) makes a modal claim about the antecedent proposition ‘that it stops raining’ (p): what is conveyed is a speaker-desire for p to be true. On its prototypical reading given in the translation, this is an *unattainable desire* (von Stechow & Iatridou 2023): p is both desired and believed to be false, i.e. the speaker believes that it’s raining, and there is no end in sight. The saliency of this ‘counterfactual’ reading is remarkable in that (21) lacks dedicated verbal morphology that readily licenses counterfactual inferences. It confirms Jiang’s (2019) view that Chinese counterfactuality has more to do with certain idiomatic constructions than dedicated morphemes. In any case, an in-depth look at (21) will add to the crosslinguistic study of counterfactuality and its “grammatical ingredients” (Iatridou 2000).

The counterfactuality of (21) is only a tendency: Hole (2004) shows such constructions to be semantically underspecified as to the ‘epistemic status’ of the antecedent p. Besides the ‘unattainable’ reading, there is also a *hypothetical* (‘if it stops raining, it will be good’) and even a *fac-*

tual one ('it is good that it stopped raining'). So while the counterfactual reading may be the default, it is not semantically entailed; we hence expect it to be subject to contextual variation. (Also, the contribution of the aspectual particle *le* remains to be further elucidated. Its expressive range includes exclamation, which fits the optative reading the sentence has, but probably more needs to be said.)

There is also variation regarding the scalar particle used in the consequent. (21) is of the pattern 'if p, *jiu* good', where *jiu* is taken by us to instantiate an operator $\text{MIN}_{\text{SCHON}}$, inducing a bottom-end scalar reading. In other words, *jiu* may well play a similar role as Grosz (2012) assumes *only* to play in optatives of the form *If only p!* – an obvious difference being that it sits in a structurally higher position. However, Hole (2004) also offers bouletic CECs involving the scalar exclusive particle *cai* 'only; not until' instead of *jiu*:

- (22) Ni gen wo shangliang **cai** hao.
 you with me discuss **CAI** good
 'I wish you had discussed it with me.' Hole (2004: 17)

In conditional consequents, *cai* induces an 'only if' reading: in 'if p *cai* q', p is conveyed to be a *necessary* condition for q; by contrast, *jiu*-conditionals of the form 'if p *jiu* q' come with p's *sufficiency* for q (Lai 1999). On our view, *cai* realizes MIN_{ERST} : a top-end scalar reading to the exclusion of lower elements on the scale at play. A question to be addressed is what difference the switch from *cai* to *jiu* brings. Judging from the translation in (22), 'unattainable' readings are at least available, but are they equally salient? Does the necessity-reading induced by *cai* intensify the desire the speaker is conveyed to have for the antecedent p in some way, making p something that is necessary, not merely sufficient, for them to be in a desirable state of affairs? (On a related note, sentence-final *le* is absent from (22), following the tendency for *cai* and *le* not to co-occur, but see Alleton (1972) for exceptions. The absence of *le* from (22) casts some doubt on *le*'s function being purely exclamative in (22) – there is no obvious difference in 'exclamativity' between the two examples.)

As is obvious from Hole's (2004) discussion, bouletically flavored CECs like the ones just looked at are just a prototypical case. Chinese CECs come in at least three different flavors: bouletic, teleological (goal-related) and deontic (rule-related); they thus seem to range within the domain of what Portner (2007) calls *priority modality*. The source of variation is the evaluative predicate instantiating the consequent, q_{flavor} . They also vary between *cai* and *jiu*, giving rise to the pattern 'if p {*jiu*, *cai*} q_{flavor} '. The question what difference the two particles make pertains to a broader class of modal constructions. A plausible working hypothesis already foreshadowed above and schematized in (23) is that *cai* brings about p's *necessity* – its truth in all possible worlds of the flavor specified by q_{flavor} –, and *jiu* its *possibility* – its truth in some of those worlds:

- (23) a. if p *jiu* q_{flavor} \sim > it is *possible* that p
 b. if p *cai* q_{flavor} \sim > it is *necessary* that p

The necessity hypothesis regarding *cai* comes from an exclusive semantics. The possibility-hypothesis may seem a bit less obvious. We suggest that it can be derived as follows: *jiu* marks p as one condition among possible others that (minimally) suffices for the state of affairs described by q_{flavor} to come true. This translates into the existential statement that some, though not necessarily all, q_{flavor} -worlds are p-worlds: a potential revival of Hole's (2004) analysis of *jiu* as reflecting a negated universal.

A third parameter of variation we wish to consider is the presence of a second modal element within a CEC, in addition to q_{flavor} . In (24), this is the desire predicate *xiwang* 'hope'.

- (24) Xiwang mei-you shi cai {hao, *shi}.
 hope not-have trouble CAI {good, *right}
 (intended:) 'I hope there is no trouble.' \approx Hole (2004: 263)

As this example shows, q_{flavor} cannot be varied arbitrarily in this case: *hao* ‘good’ is fine, but *shi* ‘right’ is not. Hole (2004) ascribes this to a matching requirement that is strongly reminiscent of *modal concord* (Geurts & Huitink 2006, Zeijlstra 2007, Grosz 2010): q_{flavor} needs to share a bouletic flavor with ‘hope’. This is ensured with *hao*, but not *shi*: while the former is also bouletic, the latter is teleological, and ungrammaticality is correctly predicted as a mismatch in modal flavor. As part of this WP, we will look into related cases of modal (dis)concord, which includes the task of figuring out the scopal constellations between the second modal and q_{flavor} .

WP3 The taxonomy of Chinese scalar particles as a window onto universal scalarity

Working hypotheses

- {*jiu*, *cai*} instantiate $\text{MIN}_{\{\text{SCHON,ERST}\}}$
- {*ye*, *dou*} instantiate $\text{MAX}_{\{\text{PARTIAL,TOTAL}\}}$
- scalar reversal with *cai* can be derived via decomposition

This WP aims at a unified view of the Chinese particles *cai* ‘not until’, *jiu* ‘already’, *dou* ‘lit.: all’ and *ye* ‘lit.: also’ (and also of certain minor particles belonging to the system, such as *hai* ‘lit.: still’ or *zai* ‘lit.: once more’) – a continuation and refinement of a longstanding project (Alleton 1972, Hole 2004 a.o.). A unified view of these particles is instructive for the study of particle systems in other languages as well, including the various readings exhibited by German *schon* ‘already’ and *erst* ‘only; not until’, respectively (Löbner 1989, Krifka 2000, von Stechow 2006), and potentially at a universal level. Pinning down their meaning contributions is also beneficial for the further refinement of a distributed syntax for scalar particles (Hole 2015, 2017, 2023; Quek & Hirsch 2017; Sun 2021): an approach under which each of the four Chinese particles occupies a specific scalarity head in the structure. The working hypothesis is that both *jiu* and *cai* instantiate variants of a minimality-operator MIN, their difference being that they operate at different scalar ends, top vs. bottom. *Ye* and *dou* each instantiate a maximality operator MAX, and differ in whether or not their alternatives are partially or totally scalarly ordered (Z. Yang 2020, Liu 2023). This approach of limiting a seeming polysemy to a variation in focus alternatives is a move strongly reminiscent of Liu’s (2017) work on *jiu* and *dou*.

A central claim we plan to substantiate is that not only *jiu* instantiates MIN, as made sufficiently clear above, but also *cai*. Just like its German counterpart *erst*, *cai* notoriously varies between ‘high’ and ‘low’ scalar readings (Lai 1999, Hole 2004, Sun 2021). Here is a simple pair of examples illustrating this difference:

- (25) a. Lisi [san dian]_F cai zai bangongshi.
 Lisi [three o’clock]_F CAI at office
 ≈ ‘Only at three o’clock was Lisi at the office.’
 ~> 3 o’clock is *late* => highness
- b. Xianzai cai [san dian]_F!
 now CAI [three o’clock]_F
 ‘It’s only three o’clock now!’
 ~> 3 o’clock is *early* => lowness cf. Lai (1999)

The ‘highness’-effect *cai* gives rise to in (25a) is paralleled by its conditional uses like the following, extensively discussed by Lai (1999).

- (26) [Among these cats,] ta (zhiyou) [san zhi lai]_F cai hui kaixin.
 she (only) [3 CL come]_F CAI will happy
 ‘only if three (of them) come will she be happy.’
 ~> 3 cats are *high* in number Wimmer (2022)

The antecedent ‘that three cats come’, which we take to be *cai*’s focus associate, is conveyed to be more noteworthy, hence scalarly higher, than its salient alternatives {that 2 cats come, that 1

cat comes}. The same effect is obtained with German *erst*. The novel approach we wish to put forth is that even the ‘high’ readings involve minimality: for the temporal case in (25a), this is a restriction on the times at which Lisi is at the office; for the conditional case in (26), a restriction on the situations in which she is happy. What underlies the scalar evaluations is the asserted exclusion of non-entailed alternatives. The notion of *pragmatic entailment* becomes relevant here (Israel 1997, 2001; Hole 2004): a state holding at a time *t* is pragmatically entailed to also hold at a later time *t'*, but not vice versa. Lisi’s presence at the office at three thus pragmatically entails her presence at later, but not earlier times, and it is this earlier presence that *cai* excludes. This approach is easier to pursue for *cai*-sentences with stative predicates like ‘be at the office’ than for ones with punctual predicates like ‘arrive’ (Hole 2004). Intuitively, sentences like ‘she eight o’clock *cai* arrive’ convey her absence at all times before eight. We think this intuition can be captured by our approach by decomposing ‘arrive’ into a change of state (via an operator CAUSE, Kratzer 2005) and a result state (BE present). *Cai*, or its exclusive contribution at least, can then be assumed to take immediate scope above ‘BE present’, thereby excluding her earlier presence as if the predicate were stative. Hole (2004) adduces suggestive evidence for such an analysis, showing that *cai*-sentences with ‘arrive’ in them may also include ‘until’: a clear indication that states preceding the arrival are at play.

(27) Xiao Wang (zhidao) ba dianzhong cai lai.

Little Wang (until) eight o’clock CAI come

‘Little Wang only came [=didn’t show up until] eight o’clock.’

Hole (2004: 128)

The approach may even inspire a (superlative) take on German *erst*, which literally means ‘first’: *erst(t)(P)* might then be taken to mean something like ‘*t* is the *first* time for state *P* to hold true’. Such an analysis will draw inspiration from a recent analysis of English *first* as a superlative ‘one+st’ (Alstott 2024).

Analytical advances on the four Chinese particles under scrutiny will inform a distributed syntax of scalar particles involving only-concord (Hirsch 2022, Yip t.a.) between ad-focus particles and higher operators. This concord relationship is exemplified by the conditional in (23). The focused antecedent serving as *cai*’s associate is optionally preceded by the exclusive particle *zhiyou* ‘only (if)’, giving rise to the seemingly redundant configuration ‘only if p_F *cai* *q*’. It seems that there is concord between the two functional elements involved at least as far as exclusiveness is concerned (Hole 2017, 2023, Sun 2021). Under our approach, *cai* is not entirely vacuous, adding the kind of ‘high’ minimality we ascribed to it above. The WP will shed more light on these kinds of interactions.

2.4 Handling of research data

We subscribe to the values of Open Science and Open Access. Therefore, all of our experimental data will be made publicly available on the online platform OSF (Open Science Foundation), without giving away sensitive data. These data include the experimental stimuli, the raw results, as well as the statistical analyses.

2.5 Relevance of sex, gender and/or diversity

We strive for gender equality. Therefore, female or diverse applicants will be given priority in any hiring processes related to the project (see below), granted an equal level of expertise.

3 Project- and subject-related list of publications

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4 Supplementary information on the research context

Section 4 et seq. must not exceed 8 pages.

4.1 Ethical and/or legal aspects of the project

4.1.1 General ethical aspects

d.n.a.

4.1.2 Descriptions of proposed investigations involving humans, human materials or identifiable data

Elicitation of native speakers' introspective judgements by use of questionnaires, and of online self-paced reading data, are standard methods of collecting data in the discipline and pose no meaningful risk to the participants' mental or physical health. Consultants are chosen on the basis of their status as native speakers of the languages under examination. The linguistic material that appears in the questionnaires (contexts and target sentences) or the self-paced reading stimuli is carefully designed to exclude any sensitive and/or potentially harmful material. Every person contacted to participate in the study is informed about the nature and goals of the study and the subsequent handling of the data that will be obtained via their participation. Participants are informed that they can opt out of completing the questionnaire at any point. All relevant information regarding informed consent is repeated at the beginning of the questionnaire.

4.1.3 Descriptions of proposed investigations involving experiments on animals

d.n.a.

4.1.4 Descriptions of projects involving genetic resources (or associated traditional knowledge) from a foreign country

d.n.a.

4.1.5 Explanations regarding any possible safety-related aspects ("Dual Use Research of Concern; foreign trade law)

d.n.a.

4.2 Employment status information

For each applicant, state the last name, first name, and employment status (including duration of contract and funding body, if on a fixed-term contract).

Prof. Dr. Hole, Daniel (full professor, permanent position, University of Stuttgart)

4.3 First-time proposal data

Only if applicable: Last name, first name of first-time applicant

d.n.a.

4.4 Composition of the project group

List only those individuals who will work on the project but will not be paid out of the project funds. State each person's name, academic title, employment status, and type of funding.

Prof. Dr. Daniel Hole (full professor)

Dr. Fabian Bross (wissenschaftlicher Mitarbeiter; Haushaltsstelle)

Dr. des. Jun Chen (wissenschaftliche Mitarbeiterin; Haushaltsstelle)

4.5 Researchers in Germany with whom you have agreed to cooperate on this project

Britta Stolterfoht, Universität Tübingen

4.6 Researchers abroad with whom you have agreed to cooperate on this project

Daniel Buring, University of Vienna, Austria

Yael Greenberg, Bar-Ilan University, Israel

Patrick Grosz, University of Oslo, Norway

Aron Hirsch, University of Maryland, USA

Mingming Liu, Tsinghua University, Beijing, China

Magdalena Kaufmann, University of Connecticut, USA

4.7 Researchers with whom you have collaborated scientifically within the past three years

Sebastian Padó, Universität Stuttgart

4.8 Project-relevant cooperation with commercial enterprises

If applicable, please note the EU guidelines on state aid or contact your research institution in this regard.

d.n.a.

4.9 Project-relevant participation in commercial enterprises

Information on connections between the project and the production branch of the enterprise

d.n.a.

4.10 Scientific equipment

List larger instruments that will be available to you for the project. These may include large computer facilities if computing capacity will be needed.

d.n.a.

4.11 Other submissions

List any funding proposals for this project and/or major instrumentation previously submitted to a third party.

d.n.a.

4.12 Other information

Please use this section for any additional information you feel is relevant which has not been provided elsewhere.

d.n.a.

5 Requested modules/funds

Explain each item for each applicant (stating last name, first name).

5.1 Basic Module

5.1.1 Funding for Staff

We plan to hire: one postdoctoral researcher (100%), one doctoral researcher (65%), as well as one student assistant (20h/month), for the entire duration of the project. For the latter two positions, female or diverse applicants will be given priority, as stated under 2.5 above.

Postdoctoral researcher (258.300€). This position is intended for Dr. Alexander Wimmer (AW), with whom the project's PI has considerable thematic overlap (focus semantics, scalarity, crosslinguistic comparisons between East-Asian languages and German). Following his dissertation investigating, among other things, the interaction between 'already'-particles in Mandarin and German and conditional constructions, AW has established himself as a semanticist whose expertise includes conditionals, desire predicates, and scalar particles.

Doctoral researcher (155.610€). The doctoral researcher, to be co-advised by the PI and the postdoctoral researcher, will work on a topic delineated by one of the work packages defined in this proposal, present their work at international conferences, and help with organizational matters, including the two workshops we plan to host during the runtime of the project. A solid background in syntax, semantics and/or pragmatics is expected. Empirical expertise (corpus search, experimental analysis, data evaluation, fieldwork elicitation techniques) will be considered an asset. A female applicant will be given priority, as already stated under 2.5 above.

Research assistant (11.861€). The research assistant will provide help with scientifically relevant tasks including literature and corpus searches, as well as the creation of experimental stimuli. They will also be encouraged to write their MA thesis on scalarity. They will work 20 hours per month.

In sum, we apply for a total of **€ 425 771**.

5.1.2 Direct Project Costs

5.1.2.1 Equipment up to € 10,000, Software and Consumables

Basic hardware (desktop) will be provided by the employer.

We apply for consumables up to an amount of **€ 2000**.

We apply for software up to an amount of **€ 500**.

We apply for a laptop for the doctoral researcher up to an amount of **€ 800**.

In sum, we apply for a total of **€ 3 300** for equipment, software and consumables.

5.1.2.2 Travel Expenses

Over the entire runtime of the project, we plan to attend 6 international and 6 national conferences, primarily those concerned with formal syntax and semantics, but also considering opportunities to increase the visibility of our findings. Presentation only at selective conferences in the fields of syntax, semantics and pragmatics. The national ones include: Sinn und Bedeutung (SuB) and the Annual meeting of the Deutsche Gesellschaft für Sprachwissenschaft (DGfS). The international ones include: the Amsterdam Colloquium, Chicago Linguistic Society (CLS), European Association of Chinese Linguistics (EACL), International Association of Chinese Linguistics (IACL), North East Linguistic Society (NELS), Semantics and Linguistic Theory (SALT), and the West Coast Conference on Formal Linguistics (WCCFL). **To work sustainably, we will partially opt for remote online participation.**

6 national conferences	per item	total
6 x domestic travel	300	1800
6 x accommodation (2 nights)	240	1440
6 x participation fee	40	240
Sum domestic travel	580	3 480

6 international conferences	per item	total
4 x international travel	500	2000
4 x accommodation (3 nights)	360	1440
6 x participation fee	60	360
Sum international travel	580	3 800

We apply for a total sum of travel expenses of **€ 7 280**.

5.1.2.3 Visiting Researchers (excluding Mercator Fellows)

d.n.a.

5.1.2.4 Expenses for Laboratory Animals

d.n.a.

5.1.2.5 Other Costs

As laid out above, WP2 foresees an experimental investigation on *minimal sufficiency* in German. We plan to conduct two studies, which we expect to require a total amount of € 921 for compensation of participants, assuming in each case: a number of 60 participants, a duration of half an hour, and an hourly payment rate of € 13,95 (€ 16,74 on *prolific*).

0.5 hrs/per participant x € 15,35 (mean hourly remuneration) x 120 = **€ 921**.

5.1.2.6 Project-related Publication Expenses

We strictly aim for publication in relevant journals and conference proceedings of only the highest quality assurance in the field. Candidate journals include: the Journal of East Asian Linguistics (JEAL), Natural Language and Linguistic Theory (NLLT), the Journal of Semantics (JoS), Linguistics and Philosophy (L&P), Natural Language Semantics (NLS) etc. Candidate proceed-

ings correspond to (most of) the conferences named under 5.1.2.2. We prioritize publication in open-access journals and journals with an open-access option.

We apply for a total of **€ 2250**.

5.1.3 Instrumentation

5.1.3.1 Equipment exceeding € 10,000

d.n.a.

5.1.3.2 Major Instrumentation exceeding € 50,000

d.n.a.

5.2 Module Temporary Position for Principal Investigator

d.n.a.

5.3 Module Replacement Funding

d.n.a.

5.4 Module Temporary Clinician Substitute

d.n.a.

5.5 Module Mercator Fellows

d.n.a.

5.6 Module Workshop Funding

We plan to host two two-day workshops during the runtime of the project: one kick-off workshop and a second one after two and a half years, the first one serving networking and inspirational purposes, the second one aiming to discuss our results with a group of experts on the topic. For both of the workshops taken together, we plan **to invite 6 speakers, 3 of which will be funded through the University of Stuttgart**. The expected expenses that we apply for amount to **6200€** in total, as listed below.

Workshops	per item	total
3 x travel	400	1 200
3 x accommodation (2.5 nights)	300	900
Catering (4 days x € 500)	500	2 000
Sum workshops	1 200	4 100

5.7 Module Public Relations Funding

d.n.a.

5.8 Module Standard Allowance for Gender Equality Measures

Please detail what measures are planned to promote diversity and equal opportunities.

*If you are submitting your proposal for an individual research grant within a **network**, note that this standard allowance may only be applied for within the coordination project. The coordination project must combine all such requests in its calculation.*

We apply for a total of **3000 €** to allow the foreseeably female or diverse doctoral candidate participation in group-specific networking opportunities and career-building trainings.