Exhaustifying conditionals

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A Mandarin conditional sentence with the form [p, *jiu* q], where *jiu* is a preverbal particle, can (but not always) convey the minimal sufficiency interpretation that nothing more — other than p — needs to be true in order for q to be true. Moreover, the exclusive focus expression *zhiyao* can be inserted in p without changing the minimal sufficiency interpretation. This paper proposes an exhaustification-based semantic account, according to which: (i) *jiu* is a special exhaustivity operator over a conditional structure, giving rise to what I call the AT LEAST component; (ii) the AT LEAST component is subject to another layer of exhaustification by a covert exhaustivity operator O, giving rise to the minimal sufficiency reading; and (iii) *zhiyao* is an agreement marker inside the antecedent clause which signals the existence of O at the root level. Previous accounts of conditional *jiu* are also reviewed and discussed.

Keywords: Mandarin *jiu*, conditionals, minimal sufficiency, *only*, (recursive) exhaustification

1. Introduction

The Mandarin preverbal particle *jiu* is known as a "backward linking" element which marks a clause as "dependent on the previous clause for its meaning to be complete" (Li & Thompson 1981: 632). Its occurrence can create an *if*-type conditional reading over two adjacent clauses, as shown in (1), which would otherwise be interpreted as a conjunction, were the *jiu* removed.

(1) *Wo shi Meiguo ren, jiu bu hui shuo zheme zao de Yingwen.*
I be American person JIU not will speak this rotten DE English
'If I were an American, then I wouldn't be speaking such bad English.'
(Li & Thompson 1981: 644)

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Meanwhile, at least some conditionals in Mandarin do not require either *jiu* or a "forward linking" element such as *ruguo* 'if' in the antecedent. Example (2) provides one such example.

(2) *Nimen bu zuo gong, women bu fu qian.*
you.PL not do work we not pay money
'If you don't work, we don't pay.' (Li & Thompson 1981: 643)

A natural question is what the semantics of *jiu* should be so that it looks like a conditional marker but is not required for conditionality. In addition, *jiu* also frequently delivers the so-called minimal sufficiency reading (Wimmer 2022) in a conditional form, and the same reading also obtains when the expression *zhiyao* (consisting of *zhi* 'only' and *yao* 'need') occurs in the antecedent. That is, (3a) is perceived as equivalent to (3b). The question is how minimal sufficiency arises and how *jiu* and *zhiyao* interact with each other so that their co-occurrence does not result in redundancy.

(3) a. *Xiayu*$_{F}$, *wo jiu bu qu.*
rain I JIU not go
'If it rains, I will not go.' (minimal sufficiency reading: "Raining" alone suffices to render the consequent true)
b. *Zhi-yao xiayu, wo jiu bu qu.*
only-need rain I JIU not go
'If it rains, I will not go.'

For easy reference, I shall call conditional forms like (3a) "*jiu*-conditionals" (without any conditional marker, such as *ruguo* 'if', in the antecedent), and those like (3b) will be referred to as "*zhiyao*-conditionals" hereafter.[1] Along with the simple conditional [p, q] (e.g. (2)), Mandarin has the following three kinds of conditionals in (4), all of which can generally be translated with 'if p, then q'.

(4) a. p, q (simple conditional, (2))
b. p, *jiu* q (*jiu*-conditional, (1)/(3a))
c. *zhiyao* p, *jiu* q (*zhiyao*-conditional, (3b))

As we shall see, however, the presence of *jiu* in a conditional imposes semantic effects that are not seen in simple conditionals, and there is a way to derive the semantic equivalence between (3a) and (3b) despite the fact that *zhiyao*-conditionals contain an overt exclusive element not present in *jiu*-conditionals. The bulk of this paper will be concerned with the semantics of the conditionals in (4b) and (4c).

1. These are simply descriptive terms without theoretical implications.

In particular, this paper will review the compositional analysis by Wimmer (2022) in detail, discuss several challenges it faces, and launch a new proposal based on the idea that (4b) has the LF structure "$O_{JIU}[p \rightarrow q]$", where O_{JIU}, the logical reflex of *jiu*, is a special exhaustivity operator which scopes over a conditional structure and carries an existential presupposition. Due to O_{JIU}, (4b) has the assertion that *at least* p needs to be true in order to verify q, and the presupposition that some proposition needs to be true to verify q. The assertive content can be optionally strengthened by another, more general exhaustivity operator O above $O_{JIU}[p \rightarrow q]$, yielding the minimal sufficiency interpretation that *at most* p needs to be true in order for q to be true. I argue that *zhiyao* in (4c) is an overt marker (within the antecedent) in an agreement relation with the silent O; in other words, (4c) has the LF "$O[O_{JIU}[p \rightarrow q]]$". This new account is also compositional and can explain why (4b) and (4c), while having different logical representations, may both give rise to minimal sufficiency.

In §2, I firstly review Wimmer's (2022) account and then point out certain issues of this account. §3 begins with key observations about *jiu*-conditionals, followed by the main proposal of this work on both *jiu*-conditionals and *zhiyao*-conditionals. §4 briefly reviews two recent semantic accounts of conditional *jiu*, before §5 concludes this paper.

2. Wimmer (2022) on *zhiyao*-conditionals

2.1 Summary

Wimmer (2022) argues that *zhiyao*-conditionals express minimal sufficiency, i.e., sufficiency with scalar lowness of the conditional antecedent. The scalar lowness can be easily observed by the sequence of conditionals in (5): (5b) is odd because *zhiyao* requires the antecedent 'Mary and John come together' to be scalarly low (i.e. logically weaker), a requirement not met here. In contrast, (5c), where the conditional marker in the antecedent is *yaoshi* 'if', is fine as a continuation of (5a).[2]

(5) a. *Yao-shi Mali lai, wo jiu kaixin.*
need-be Mary come I JIU happy
'If Mary comes, I am happy.'

2. Most examples of *zhiyao*-conditionals in Wimmer's work are given only meaning paraphrases but not direct translations. This paper uses *as long as* for the translations of these conditionals whenever appropriate. Whether *zhiyao* is indeed semantically equivalent to *as long as* in English is beyond the scope of this paper.

b. ??*Zhi-yao Mali he Yuehan yiqi lai, wo ye kaixin.*
only-need Mary and John together come I also happy
'I am also happy as long as Mary and John come together.'

c. *Yao-shi Mali he Yuehan yiqi lai, wo ye kaixin.*
need-be Mary and John together come I also happy
'I am also happy if Mary and John come together.'

(Wimmer 2022: 414–415)

Following Greenberg's (2019) view on English *only*, Wimmer further claims that *zhiyao* requires its prejacent to be ranked the lowest among contextually relevant alternatives. Evidence comes from the marginality of (6b) in the context of (6a), which is due to 'three' being not the lowest number of peaches.

(6) a. Context: John is full after eating one peach. Mary is full after eating five peaches.

b. ?*Xiao-Wang zhi-yao (chi) san-ke taozi jiu bao le.*
Little-Wang only-need eat three-CL peach JIU full ASP
'Little Wang is full after eating as few as three peaches.'

(Wimmer 2022: 415)

All examples of *zhiyao*-conditionals discussed in Wimmer (2022) are argued to behave in the same way: The antecedent adjacent to *zhiyao* is always ranked the lowest on a relevant scale, and *zhiyao* marks a sufficiency conditional. Similar examples include those in (7).[3]

(7) a. *Zhi-yao san-zhi maomi lai, ta jiu kaixin.*
only-need three-CL cat come she JIU happy
'As long as three cats come, she is happy.' (Wimmer 2022: 424)

b. *Ni zhi-yao nuli jiu neng chenggong.*
you only-need diligent JIU can succeed
'As long as you are diligent, you can succeed.' (Wimmer 2022: 404)

Wimmer (2022) proposes the following semantics in (8) for *zhiyao* (see also Wimmer 2020) as a special conditional operator which carries the presupposition "$\text{low}_C(p)$" as defined in (9a) (every alternative in the set of salient alternatives C that is not identical to the antecedent p is ranked higher than p) and *yao* 'need' as the (often epistemic or doxastic) necessity modal in (9b), which takes two propositions and maps every p-world to a q-world.

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3. A reviewer comments that (7a) is better replaced by examples such as '*Zhiyao* three customers come, I will be happy', which are more natural in real life than (7a). I agree, but since this paper takes Wimmer (2022) as its starting point, I shall continue to adopt his original data points whenever relevant. Note also that Example (7b) and its variants are cited but not given a detailed analysis in Wimmer's work, and thus exactly how the minimal sufficiency reading of such examples is calculated remains unclear.

(8) $[\![\text{zhiyao}_C]\!] = \lambda p \lambda q$:
   a. $\text{low}_C(p)$.
   b. $\forall w'$: $[p(w') \ \& \ \neg \exists p' \in C: p' \neq p \ \& \ p'(w')] \rightarrow q(w')$
   (Wimmer 2022: 423)

(9) a. $\forall p' \in C: (p' \neq p \rightarrow p <_C p')$ (lowness, Wimmer 2022: 416)
   b. $\lambda p \lambda q. \ \forall w: p(w) \rightarrow q(w)$ (*yao* 'need', Wimmer 2022: 419)

In words, *zhiyao* presupposes that its prejacent p (the antecedent) is the lowest element on some scale determined by C, and asserts that for every epistemically/doxastically accessible world in which p is true and no other alternative proposition is true, q is true, as in (8b). That is, if p and only p is true, q is necessarily true. Wimmer further notes that, based on this semantic analysis, a *zhiyao*-conditional with the syntactic form in (10a) actually has the mismatching LF in (10b), where the modal *yao* takes the widest scope, in order to derive (8). I refer the reader to Wimmer's work for more details on this compositionality issue, including a discussion of *yao* as a neg-raising modal.

(10) a. [[*zhiyao* p] q]
   b. *yao*(*zhi* p)(q) (Wimmer 2022: 423)

This analysis captures the lowness requirement of *zhi* 'only', which can also be observed for its adverbial use, as well as the necessity conditional meaning of the *zhiyao*-conditional. But (8) by itself does not explain the additive inference of *zhiyao*-conditionals, i.e., any proposition stronger than p will also verify q. Following Panizza & Sudo's (2020) account on English *just*, Wimmer proposes that the additive inference of *zhiyao*-conditionals (one that is cancelable) comes from a covert *even*-operator, which is inserted at the root level, as in (11), and contributes the scalar presupposition in (12a) and the additive presupposition in (12b).[4]

(11) $\text{even}_{C'}$ [[zhiyao_C [p]] [q]]

(12) $[\![\text{even}_{C'}]\!]$ (p) presupposes
   a. p to be the least likely alternative in C′, and
   b. all q in C′ other than p to be true.[5] (Wimmer 2022: 426)

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4. The *even*-operator and *zhiyao* are associated with different alternatives: The alternatives of the former (C′ in (11)) are complete conditional constructions with the form '*zhiyao*(p)(q)', whereas those of the latter (C) are derived from an F-marked constituent inside the antecedent proposition (i.e., p).

5. Note that the "q" variable ranges over not consequent propositions but alternatives of p in the C′ set, i.e., the alternatives of the entire complex proposition [[zhiyao_C [p]] [q]] in (11).

With covert *even*, (7a), for instance, presupposes that if more than three cats come, she would be happy. This gets us the additivity inference of *zhiyao*-conditionals.

In Wimmer's account, *zhiyao* is designed to interact with C, a set of contextually salient focus alternatives of its prejacent-antecedent, and the antecedent is ranked lowest among such alternatives (due to lowness) but these alternatives may or may not be logically stronger than the antecedent. For the instances of *zhiyao*-conditionals he discusses, the relevant alternatives are entailment-based and fairly easy to obtain, e.g. (13a) for (5b) (where the subject 'Mary and John' is focused) and (13b) for (7a) (where '3 cats' is focused). Alternatives based on a pragmatic, non-logical scale are also possible, e.g. (13c), as with the adverbial *zhi* 'only'.[6]

(13) a. C = {'Mary and John come together', 'Mary, John and Sue come together', ...}
b. C = {'3 cats', '4 cats', ...}
c. C = {'you smile', 'you bake a cake', 'you take me to Paris', ...}

In short, Wimmer (2022) presents an account where *zhiyao* marks a (necessity) conditional construction (the contribution of *yao* 'need') and signals the lowness of the conditional antecedent as a scalar presupposition (the contribution of *zhi* 'only'). The properties of the *zhiyao*-conditionals with the form [*zhiyao* p, q] discussed in Wimmer's work can be summarized as follows:

- *Zhi* and *yao* introduce scalar lowness and necessity, respectively.
- The scalar lowness of *zhi* requires p to rank lowest on a salient scale consisting of p and its scalar alternatives.
- The LF of a *zhiyao*-conditional is the mismatching *yao*(*zhi* p)(q), where *zhi* scopes below *yao*.
- The LF can be enriched by a silent *even* at the root level to generate additivity.

2.2 Issues

First, there are many *zhiyao*-conditionals in which the antecedent does not seem to contain any F-marked expression. Wimmer's (2022) example shown earlier in (7b) is one such case: What should the relevant scale be where 'you are diligent' ranks lowest? Consider also (14):

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6. The set (13c) is from Wimmer (2020: 70). In saying *Zhi-yao ni xiao, wo jiu kaixin* 'As long as you smile, I am happy', the speaker S can imply that it does not require you to bake a cake or take S to Paris in order to make S happy.

(14) *Zhi-yao shuo-huang, jiu (shi) bu dui.*
only-need tell-lie JIU be not right
'As long as one lies, (such a behavior) is wrong.'

One might say that *zhi* 'only' indicates scalar lowness as usual by ranking the antecedent 'one lies' lower than all alternative propositions entailing it, e.g. 'one lies intentionally'. Thus, if one lies, it is wrong, and of course if one lies intentionally, it is also wrong. However, propositions such as 'one lies and it is sunny' and 'one lies and my house is red' also entail 'one lies', but these propositions seem irrelevant. If *zhi* in cases like (14) still signals scalar lowness, the relevant scale cannot simply be one of logical strength.[7] Our intuition is that (14) is typically uttered as a response to the statement 'If one lies just once, that is acceptable' or to the question 'Is it okay to lie with a good intent?'. The relevant alternatives to the antecedent therefore should only include "lying-related" propositions which are all being evaluated with some moral standard; since it makes no sense to talk about whether 'one lies and it is sunny' is wrong, such propositions can be safely excluded from the analysis of (14).

What the discussion above shows is that to determine the relevant set of scalar alternatives in cases like (14), we have to look at not only the antecedent *but also the consequent*; what counts as low or high in a scale is relative to the worlds in which the consequent is true. This point is unaddressed in Wimmer's analysis, where scalar lowness is attributed to *zhi* and *zhi*'s argument does not include the consequent of a conditional, but is crucial to the semantics of *zhi* in *zhiyao*-conditionals. As it turns out, even in cases where the antecedent contains an F-marked phrase that clearly evokes focus alternatives, the F-marked phrase does not have to denote the lowest scalar point among contextually salient alternatives to the antecedent. Under the context of (15a), there is nothing wrong for me to utter the second conditional in (15b), even though 'five' is clearly not the lowest scalar point (in terms of quantity).

7. As reviewed above, *zhiyao* does not require that relevant alternatives be ranked based on logical strength. But the alternatives mentioned here — e.g., 'one lies and it is sunny' — also cannot be regarded as "stronger" than 'one lies' on any rank-order reading.

(15) a. Context: There are five watermelons in front of us.
b. *Zhi-yao ni chi-wan* [*yi-ke xigua*]$_F$, *wo jiu gei ni shi yuan.*
only-need you eat-finish one-CL watermelon I JIU give you ten dollar
Erqie bu zhi zhe-yang.
and not only this-manner
Zhi-yao ni chi-wan [*wu-ke xigua*]$_F$, *wo jiu gei ni wushi yuan.*
only-need you eat-finish five-CL watermelon I JIU give you fifty dollar
'As long as you finish one watermelon, I will give you ten dollars. And not just that. As long as you finish five watermelons, I will give you fifty dollars.'

The crucial difference between (15b) and examples like (6b), which Wimmer uses to justify the lowness property of *zhi*, is the following. The alternatives relevant to (6b) ('one peach', 'three peaches', 'five peaches') characterize the conditions under which the predicate *bao* 'full' holds true of a person; if John is full by eating one peach and Little Wang needs three, then three cannot be considered lowest with respect to the conditions making a person full. On the other hand, in (15b) 'one watermelon' and 'five watermelons' do not constitute the conditions that make the same consequent true. Thus, even though the antecedents of the two *zhiyao*-conditionals are focus alternatives of each other (differing in the F-marked constituent), both instances of *zhiyao* are fine. As will be suggested in § 3.3, the two instances of *zhiyao* in (15b) actually target and eliminate different sets of alternatives: The quantificational domain of the first *zhiyao* may involve a set of alternatives with the full conditional form 'If you finish 1 watermelon in t, I will give you $ 10' where t is a variable over time intervals, and the second 'If you finish 5 watermelons in t, I will give you $ 50'. In other words, the exclusive components of the two *zhiyao*-conditionals are independent of each other.

As the last example illustrating the same point, imagine that you are playing a game where you can win a prize by providing correct answers to exactly three questions, and the third one is far more difficult than the first two. In this context I can felicitously utter (16):

(16) *Ni yijing da-dui le diyi-ge he dier-ge wenti. Zhi-yao*
you already answer-correct ASP first-CL and second-CL question only-need
da-dui disan$_F$*-ge weiti, ni jiu neng huode jiangpin.*
answer-correct third-CL question you JIU can win prize
'You have correctly answered the first and second questions. As long as you answer the third question correctly, you will win a prize.'

The ordinal 'third' in the *zhiyao*-conditional is focused, the relevant alternatives of which can only be the other two ordinals 'first' and 'second'. But it is unclear in what sense 'third' ranks lowest in this scale or what the scale should be.[8]

Note that it is actually possible for Examples (14)–(16) to be compatible with Wimmer (2022), if scalar lowness is defined relative to the consequent proposition of a conditional. These examples, therefore, are not intended as true counter-evidence to his account. However, (14)–(16) do demonstrate that the consequent proposition must be factored in when determining the meaning of a *zhiyao*-conditional, and thus a proper theory of this conditional construction should explicate the role of the consequent in the derivation of scalar lowness and minimal sufficiency. Wimmer's (2022) lowness is defined without regard to the consequent, and while his account does posit a covert *even* that scopes above the entire *zhiyao*-conditional in order to capture minimal sufficiency, this operator is not part of the lexical semantics of *zhiyao* in his framework (see below for more discussion on the covert *even*). What we need is a theory where the consequent of a *zhiyao*-conditional is *always* part of minimal sufficiency.

Another issue that is briefly remarked on but not resolved in Wimmer (2022) is that the minimal sufficiency reading of a *zhiyao*-conditional is in fact available even without *zhiyao*, so long as the preverbal particle *jiu* is present in the consequent and some expression in the antecedent is focused. Thus, both (17a) and (17b) can convey that nothing more than Mary coming or three cats coming is needed for me to be happy. Since *jiu* can license minimal sufficiency without *zhiyao*, it seems more plausible to consider *jiu*, rather than *zhiyao*, the primary source of minimal sufficiency, and scalar lowness is not necessarily a property exclusive to *zhi* but instead could be signaled by *jiu* as well. As I shall argue in § 3, there is a way to derive minimal sufficiency with *jiu* alone, while also allowing *zhiyao* to co-occur with *jiu*.

(17) a. [*Mali*]$_F$ *lai*, *wo jiu kaixin*.
Mary come I JIU happy
'As long as Mary$_F$ comes, I am happy.'

8. One reviewer suggests that in the case of (16), the ordering relation can be some notion of temporal precedence and the antecedent under discussion (containing the ordinal 'the third question') is the latest (and thus the lowest): an earlier question ranks higher than the later question. However, ranking a later time as "lower" than an earlier time is counterintuitive at best. Moreover, the intuition about the use of *zhiyao* in (16) is that it conveys that nothing other than correctly answering the third question is required to win a prize. This minimal sufficiency interpretation does not seem to bear on the temporal relation among the events of answering questions, because one may as well say '*Zhiyao* you answer this question correctly, you will win a prize' in a situation where there is only one question to answer. See also Footnote 17.

b. [*San*]$_F$*-zhi maomi lai, wo jiu kaixin.*
three-CL cat come I JIU happy
'As long as three$_F$ cats come, I am happy.'

Third, applying the *even*-insertion analysis to Mandarin does not seem to be on the right track. Panizza & Sudo's (2020) approach to the minimal sufficiency *just* relies in part on the felicitous insertion of an overt *even* before *just* without change in meaning, as in (18). Not all *zhiyao*-conditionals tolerate an overt *even* in Mandarin, however; while (19a) sounds natural, (19b) does not (cf. the two examples in (7)). The intuition is that (19b), with *shenzhi*, conveys that it is least likely the case that being diligent can make you succeed. Clearly, this is not what (7b) intends without *shenzhi*, and many examples of *zhiyao*-conditionals to be discussed in the next section have a different meaning with *shenzhi* than without it. This weakens Wimmer's *even*-insertion analysis on the additivity of *zhiyao*-conditionals; it must be derived in another way.[9]

(18) Even just one$_F$ cat will make Patrick happy. (Panizza & Sudo 2020: 2)

(19) a. *Shenzhi zhi-yao san$_F$-zhi maomi lai, ta jiu kaixin.*
even only-need three-CL cat come she JIU happy
b. #*Shenzhi ni zhi-yao nuli$_F$ jiu neng chenggong.*
even you only-need diligent JIU can succeed

In addition, recall that a covert *even* is introduced by Wimmer in order to derive the additivity of *zhiyao*-conditionals. With *even*, the LF of (7a) is (20): It presupposes that all alternative conditionals in C′ are true, and that the prejacent conditional is the least likely alternative in C′. It follows that four or more cats coming will also make her happy.

(20) even$_{C'}$ [[zhiyao$_C$ three$_F$ cats come] [she is happy]]

Notice, however, that such an additive inference holds for *if*-conditionals generally because the *if*-clause is downward-entailing (DE): If three cats coming makes her happy, then four cats coming should as well. It does seem true that, for (7a), the number 'three' marks the lowest scalar point, but Wimmer's analysis of *zhi* as a presuppositional particle of lowness already ensures that 'three' is lower than

9. Both reviewers note that this conclusion is valid only if the covert *even* is the same one as *shenzhi*. The point here, though, is not that *shenzhi* has the same semantics as English *even* or its covert counterpart, but rather that if, for any language L, additivity or minimal sufficiency is really derived by a covert *even* in L which can be optionally pronounced, then we expect it to be a generally available strategy for minimal sufficiency constructions in L (taking into account the distributivity condition discussed in Panizza & Sudo 2020). The contrast in (19) demonstrates that *shenzhi* does not apply equally well across *zhiyao*-conditionals in Mandarin.

all alternative values. Since the semantics that Wimmer tries to derive through a covert *even* is already independently available from the DE property of conditional antecedents and scalar lowness of *zhi*, the *even*-insertion analysis seems unnecessary.

Fourth, recall that Wimmer's account requires the modal *yao* to scope over an entire *if*-conditional where *zhi* is embedded inside the antecedent. The LF of *zhiyao*-conditionals that he proposes is (10b), repeated below as (21). In every world in which p and only p is true, q is true.

(21) *yao*(*zhi* p)(q)

However, notice that an *if*-conditional with an exhaustified antecedent by O/*only* is entailed by, or weaker than, a simple *if*-conditional (O is a silent exhaustivity operator that is roughly the covert counterpart of *only* except without the presupposition of *only*; Chierchia 2006, 2013; Fox 2007; Chierchia et al. 2012), as shown in (22).

(22) $[p \rightarrow q] \subseteq [O[p] \rightarrow q]$ (Chierchia 2006: 552)

For instance, *If three cats come, she is happy* is stronger than *If three but not more cats come, she is happy*, because if the former conditional holds, the latter does as well (but not vice versa). A problem with (21), then, is that the presence of *zhiyao* renders a conditional weaker or less informative. More concretely, (23) below is a case where a conditional antecedent is explicitly exhaustified. If (7a) has the LF in (21), then the former should mean the same thing as (23).

(23) *Ruguo zhi-you san$_F$-zhi mao lai, ta jiu hui hen kaixin.*
if only-have three-CL cat come she JIU will very happy
'If only three cats come, she will be happy.'

But our intuition is that (23) is different from (7a), as the former implies, without any contextual support, that if more than three cats come she will not be happy. This is a marked, weakened reading of a conditional when O scopes over the antecedent proposition only. By contrast, even though (7a) is compatible with such an implication, (7a) by no means conveys it by itself. The following pair in (24) further illustrates this point: The LF (21) predicts that (24a) and (24b) should mean the same thing, but they do not — the former clearly entails the latter. As a reviewer points out, *zhi* in (24b) can only take scope inside the *if*-clause.

(24) (Under what situations will you go?)
a. *Zhi-yao Lisi bu qu, wo jiu qu.*
only-need Lisi not go I JIU go
'As long as Lisi doesn't go, I will go.'

b. *Ruguo zhi-you Lisi bu qu, wo jiu qu.*
if only-have Lisi not go I JIU go
'If only Lisi doesn't go, I will go.'

Since *zhiyao*-conditionals are not perceived as less informative than corresponding *if* conditionals in any way, this means the *even*-operator is actually obligatory if Example (21) is indeed the LF of a *zhiyao*-conditional. It is, nonetheless, unclear whether Wimmer takes the covert *even* to be obligatory. Such a complicated analysis is also less ideal than one that allows *zhiyao* itself to strengthen the meaning of a conditional without the postulation of some additional operator.

Lastly, although the treatment of *yao* as an overt necessity modal of a conditional is appealing given that *yao* also expresses necessity as a modal auxiliary ('need') or verb ('want'), *yao* also appears as part of the conditional markers *yaoshi* 'if' and *yaobushi* 'if it were not (the case that)' (*shi* a copula, *bu* negation), which is independent of the quantificational force of a conditional (which is determined by the modal in the consequent), as shown in (25a–b). Thus, *yao* in *zhiyao* could just as well be nothing more than a grammaticalized element like *yao* in *yaoshi*/*yaobushi* without inherent modality.

(25) a. *Yaoshi xiayu, ta yiding/keneng bu hui lai.*
if rain he necessarily/possibly not will come
'If it rains, he necessarily/possibly won't come.'
b. *Yaobushi xiayu, ta yiding/keneng hui lai.*
if.it.were.not rain he necessarily/possibly will come
'If it were not the case that it rained, he would necessarily/possibly have come.'

Note that (25) also demonstrates that, as with English, the quantification of a conditional construction is determined by the overt modal (if there is one) in the *consequent* clause, not the antecedent. Analyzing *yao* as an overt modal marking a full conditional structure is therefore inconsistent with the general pattern of Mandarin conditionals.

3. Proposal: Exhaustification over conditionals

My analysis of the *jiu*-conditional with the form [p, *jiu* q] is established on the following observations:

- The antecedent p need not rank lowest among salient alternatives.
- [p, *jiu* q] is infelicitous in three kinds of contexts: one where q is known to hold true regardless of what p is, one where there is evidence toward ¬q under

the condition specified by p, and one where the speaker has no evidence that q is possible under the condition specified by p.

These observations will be taken to support the idea that conditional *jiu* is an exhaustivity operator over a conditional [p → q]. It presupposes that some proposition makes q true, and asserts that at least p has to be true in order for q to be true. This semantics of *jiu* is subject to further exhaustification by another (covert) exhaustivity operator, which I shall argue is the source of the minimal sufficiency reading.

3.1 Some observations

First, a *jiu*-conditional can be felicitously uttered even when the antecedent is not lowest among alternative antecedent propositions, as already evidenced by Examples (15b) and (16). Second, a *jiu*-conditional is infelicitous if the consequent holds true no matter what. This is shown in the following contrast between (26b) and (26c): As a continuation of (26a), the simple conditional without *jiu* in (26b) is fine (with a contrastive topic accent), but (26c) and (26d) are not. The latter two both appear to suggest that her going is somehow dependent on whether you will go, which, in this context, is not the case. This means the conditional [p, *jiu* q] requires that at least p should hold true to verify q, and q is not simply true no matter what.

(26) a. Context: Mary is determined to go hiking regardless of what happens.
b. *Suoyi*, [*ni qu*]$_{CT}$, *ta hui qu; [ni bu qu]*$_{CT}$, *ta ye hui qu.*
so you go she will go you not go she also will go
'So, if you go, she will go; if you don't, she will also go.'
c. *Suoyi*, #[*ni qu*]$_{CT}$, *ta jiu hui qu; [ni bu qu]*$_{CT}$, *ta ye hui qu.*
so you go she JIU will go you not go she also will go
Intended: 'So, if you go, she will go; if you don't, she will also go.'
d. *Suoyi*, *#ni bu qu*, *ta jiu hui qu; [ni qu]*$_{CT}$, *ta ye hui qu.*
so you not go she JIU will go you go she also will go
Intended: 'So, if you don't go, she will go; if you do go, she will also go.'

A related observation is the contrast between (27b) and (27c) under the context (27a). I can utter (27b) as a natural question given the contextual evidence (wall cracks). However, (27c) seems to be a confirmation question of the odd statement that it requires as little as raining for 'this room does not leak' to be true, which does not exist in this context. Therefore, (27c) is not an appropriate question to ask. This shows that, given the conditional antecedent, *jiu* is infelicitous when there is salient contextual evidence toward the negation of the consequent ¬q (for (27c), the negation of the consequent is 'this room will leak').

(27) a. Context: An estate agent and I are in an old house that has not been occupied for years. The agent is confident that the overall condition of the house is still good. Seeing some cracks on the wall, however, I suspect that the room in which we are standing may leak when it rains, so I ask the agent the following to confirm my suspicion.

b. *Ruguo xiayu, zhe-ge fangjian bu hui loushui ma?*
if rain this-CL room not will leak SFP
'If it rains, won't this room leak?'

c. #*Ruguo xiayu, zhe-ge fangjian jiu bu hui loushui ma?*
if rain this-CL room JIU not will leak SFP
'If it rains, does it follow that this room will not leak?'

Similarly, in the context of (28a), the staff can use (28b) to double check if you really have no interest in the product; however, given her expectation that it is more likely for you to buy the product should the price drop, (28c) would be an odd question as it implies that it takes as little as price lowering for 'you won't by it' to be true. Once again, *jiu* is not felicitous if there is evidence supporting [p → ¬q] (this time round, the evidence supporting the statement '¬[you will not buy (it)]' is not contextual but instead private or speaker-oriented; cf. Sudo 2013).

(28) a. Context: In an Apple store, a staff wonders if you will buy the iPhone 16. You show no interest, and say the product is just too expensive. Based on what she knows about customer behavior, the staff suspects that you may actually become interested if the price lowers, and asks the following to confirm her suspicion.

b. *Ruguo iPhone 16 jiang-jia, ni (ye) bu mai ma?*
if iPhone 16 lower-price you also not buy SFP
'If the iPhone 16 lowers its price, won't you buy it, either?'

c. #*Ruguo iPhone 16 jiang-jia, ni jiu bu mai ma?*
if iPhone 16 lower-price you JIU not buy SFP
'If the iPhone 16 lowers its price, does it follow that you won't buy it?'

Third, [p, *jiu* q] is also infelicitous if there is no evidence to the speaker that [p → q] holds. In the context (29a), I can felicitously ask the conditional question (29b) neutrally, but the counterpart with *jiu* in (29c) sounds like a confirmation question of the odd statement that you accepting their offer naturally follows from their scholarship-less offer.

(29) a. Context: You and I are discussing different scenarios after your PhD applications. We are looking at a particular program which you applied to and may or may not offer you scholarships. I am not sure if you like it so much that you would accept their offer even without scholarships. I ask:

b. *Ruguo tamen luqu ni dan mei-you jiangxuejin, ni hui qu ma?*
if they accept you but not-have scholarship you will go SFP
'If they accept you but without scholarships, will you go?'

c. #*Ruguo tamen luqu ni dan mei-you jiangxuejin, ni jiu hui qu ma?*
if they accept you but not-have scholarship you JIU will go SFP
'If they accept you but without scholarships, will you go?'

That a *jiu*-conditional requires a context in which there is evidence for [p → q] is quite general. In the context of (30a) below, the panel's question would only be felicitous without *jiu*, as in (30b). Otherwise, (30c) implies that the panel believes you may accept their offer, and the panel is checking whether a salary raise suffices using (30c).

(30) a. Context: In a job interview, the panel asks whether you will accept their offer if they decide to hire you. You respond honestly that you will likely accept another offer. The panel continues to ask:

b. *Ruguo women gei ni jia-xin, ni hui lai ma?*
if we for you raise-salary you will come SFP
'If we raise your salary, will you come (to work with us)?'

c. #*Ruguo women gei ni jia-xin, ni jiu hui lai ma?*
if we for you raise-salary you JIU will come SFP
'Well then, if we raise your salary, will you come (to work with us)?'

Similarly, if I have no idea whether the girl I am about to meet would be happy at all, I cannot use *jiu* in (31), for the *jiu*-conditional would suggest me being a little presumptuous in assuming she may be happy under certain circumstances.

(31) *Wo mai hua gei ta, ta (jiu) hui kaixin ma?*
I buy flower for she she JIU will happy SFP
'If I buy flowers for her, will she be happy?'

The presence of *jiu* therefore is felicitous only in contexts where the speaker of [p, *jiu* q] has evidence to believe [p → q]. Importantly, since such an inference projects out of the polar questions in (27)–(31), it behaves like a presupposition. It seems safe to conclude, based on the above observations, that [p, *jiu* q] presupposes that a certain condition has to be satisfied for q to hold, and additionally conveys that for q to be true, at least p needs to be true. What the polar questions in (27)–(31) ask about is whether this second meaning component is true.

Altogether, the above discussions show that [p, *jiu* q] is inappropriate if it is known that q holds regardless of the choice of p, if there is evidence to the speaker that [p → q] is false, and also if the speaker has no evidence that [p → q] is true. In addition, p does not have to be lower than all salient alternative propositions. Our goal is to achieve an account that can accommodate all these observations

and explain the co-occurrence of *jiu* and *zhiyao*, while not running into the same problems for Wimmer (2022). As will be shown, the data points from (27) to (31) constitute arguments for the analysis that [p, *jiu* q] has the presupposition (which projects out of a question) that some proposition makes q true, and (26) is indicative of *jiu*'s assertive content that at least p needs to be true to verify q.

3.2 *Jiu* as a conditional-specific exhaustivity operator

I argue that *jiu* is a special overt exhaustivity operator, notated as O_{JIU} from now on and defined as in (32a). O_{JIU} is similar to *only* or the covert exhaustivity operator O (as posited by Chierchia 2006; Fox 2007; and Chierchia et al. 2012 for a wide range of phenomena), except that O_{JIU}: (i) takes a conditional antecedent p as its first argument and a consequent q as the second argument (i.e., like a "two-place" *only*) and returns the exhaustified conditional statement "O[p → q]"; and (ii) presupposes that there exists some proposition p′ such that "O[p′ → q]" is true. The exhaustified form "O[p → q]" has the semantics in (32b), again following previous literature on O: It asserts (i) [p → q] and (ii) for every conditional c in a relevant alternative set C, if the prejacent of O_{JIU} (i.e., [p → q]) does not entail c, then c is false.

(32) a. $[\![\text{jiu}]\!] = [\![O_{JIU}]\!] = \lambda p \lambda q: \exists p'[O[p' \rightarrow q]]. O[p \rightarrow q]$

b. $O[p \rightarrow q] = [p \rightarrow q] \ \& \ \forall c \in C[[[p \rightarrow q] \not\subseteq c] \rightarrow \neg c]$, where C is a set of conditional propositions

A few remarks are in order. First, I assume the standard Kratzerian theory of modals, where they are quantifiers over worlds and an *if*-clause serves as a restriction of a modal operator (either explicit or implicit) in a conditional. Example (32a)/(32b) has a conditional with the notation of material implication →, but here it is used as a simplified form for a linguistic conditional constrained by conversational backgrounds in the usual way.

Second, given the DE property of conditionals, [p → q] entails an alternative conditional [p′ → q] if [p′ ⊆ p], but not if otherwise. That is, if p′ is logically weaker than p, then [p → q] does not entail [p′ → q]. Moreover, in cases where the only salient alternative of p is its polar opposite, [¬p → q] is not entailed by [p → q], either (which is orthogonal to the DE-ness of conditionals). Whether p′ is a logically weaker alternative to p or takes the form of ¬p is a matter of the contextually relevant QUD (Roberts 2012). Thus, the exhaustified form "O[p → q]" rules out alternative conditionals the antecedents of which are weaker than p or are the negative counterparts of the antecedent, namely the alternative conditionals in (33).

(33) $\{p' \rightarrow q \mid (p \subseteq p') \vee (p' = \neg p)\}$
(alternatives excluded by O when applied to $[p \rightarrow q]$)

For instance, suppose the QUD is 'How many cats makes Mary happy?', where the relevant alternatives are characterized by the set {you bring Mary n cats → she is happy}. Since [you bring Mary 3 cats → she is happy] does not entail [you bring Mary 2 cats → she is happy], the latter conditional is ruled out by O. Suppose now the QUD is 'What makes Mary happy?' instead (not targeting the number of cats), which introduces alternatives in the broader set {what happens → she is happy}. In this situation, both [you bring Mary 2 cats → she is happy] and [you don't bring Mary 3 cats → she is happy] may be activated alternatives, and neither conditional is entailed by [you bring Mary 3 cats → she is happy]. Hence, depending on the QUD, O[you bring Mary 3 cats → she is happy] requires one or both kinds of conditional alternatives to be false; i.e., Mary is happy only when a certain condition is met. In effect, applying O to $[p \rightarrow q]$ amounts to stating that at least p must be true in order to verify q, or, put differently, p is the "lower-bound" requirement for the truth of q. This is the assertive content of a *jiu*-conditional. Let us call this the AT LEAST component: *For q to be true, at least p must be true.*[10] The presupposition of *jiu* is similar to the AT LEAST component but weaker: It simply requires that there exists some proposition that qualifies as the least/lower-bound requirement for q.

Crucially, these two AT LEAST components (in the presupposition and assertion, respectively) readily explain the observation about (26)–(31) that [p, *jiu* q] is infelicitous if q is true no matter what, if the speaker has evidence toward ¬q, or if the speaker has no reason to believe q may be true. This is because *jiu*'s presupposition ($\exists p'[O[p' \rightarrow q]]$) requires that (i) q cannot be true no matter what and (ii) the speaker believes at least some proposition p′ can make q true. Moreover, *jiu*'s assertion ($O[p \rightarrow q]$) disqualifies ¬p as a verifying condition for q, because $[\neg p \rightarrow q]$ is not entailed by $[p \rightarrow q]$.

A reviewer asks what the source responsible for the alternatives of *jiu*-conditionals is. Why do all the alternatives vary only with respect to the antecedent of *jiu*-conditionals? For any two conditionals $[p \rightarrow q]$ and $[p \rightarrow q']$ where q′ is stronger than p, $[p \rightarrow q']$ entails $[p \rightarrow q]$ but not *vice versa* (e.g., 'if you give me $ 10, I will clean the floor and wash the car' entails 'if you give me $ 10, I will clean the floor'). The consequent clause is upward-entailing. Therefore, the exhaustified $O_{JIU}[p \rightarrow q]$ rules out $[p \rightarrow q']$ as well if q′ is stronger than p.

10. What I call the AT LEAST component (of *jiu*'s assertion) here corresponds to the "inception-implication" in Wimmer (2020), a concept that was originally used to describe the *already*-like aspectual usage of German *schon* and Mandarin *jiu* (see Löbner 1989; Lai 1999). The inception-implication is however left out in Wimmer (2022).

It follows that adding such alternatives of q into the exhaustification of $O_{JIU}[p \rightarrow q]$ derives the result that the only alternatives left after exhaustification are $[p \rightarrow q]$ and whatever it entails. But this just means O_{JIU} applies vacuously without truth-conditional effects. Therefore, in the discussion above alternatives of the consequent are not taken into account, as they are not crucial to the semantics of the conditional *jiu*.

Now back to (32a), it is also important to note that it does not force the minimal sufficiency reading of a *jiu*-conditional. Example (32a) simply states that nothing other/more than p is needed to verify q (which is not the AT LEAST component). This is desirable, because not every *jiu*-conditional signals minimal sufficiency. Sometimes the antecedent does not activate stronger alternatives. In the context of (34), (34b) is a perfect response to the QUD in (34a). Since it is the consequent 'we won't go' that corresponds to the wh-expression in (34a), not the if-clause, the if-clause is not under focus. Indeed, (34b)'s assertion is just (34c): If it rains, we won't go, and conditional forms not entailed by *jiu*'s prejacent are false. So, e.g., {If it doesn't rain, we will go.} (34b) does not, in this context, convey that there could be situations other than 'it rains tomorrow' to make the consequent true, as such situations are not under discussion at all.[11]

(34) Context: We plan to go hiking tomorrow. The weather forecast shows it is likely to rain.
   a. What if it rains tomorrow?
   b. *(Yaoshi) mingtian xiayu, women jiu bu qu le.*
      if tomorrow rain we JIU not go ASP
      'If it rains tomorrow, we won't go (hiking).'
   c. [it rains tomorrow → we won't go] & $\forall c \in C[[$[it rains tomorrow → we won't go$] \not\subseteq c] \rightarrow \neg c]$

11. In other words, as pointed out by a reviewer, if the context of (34) has no stronger alternatives, the question of "minimal" sufficiency does not arise (since there is only one alternative). This leads to another question of whether the use of *zhiyao* is infelicitous in the same context. It turns out that the speaker of (34b) actually can also utter a *zhiyao*-conditional (*Zhi-yao mingtian xiayu...*). But this is not surprising, since a speaker can sometimes introduce alternatives that are not present in the relevant QUD. For instance, in response to the QUD in (ia), which contains no alternatives to *I bought the book*, one can utter either (ib) or (ic) with *only*. Both (ib) and (ic) require the QUD 'What did you buy?' which is not explicit in the immediate context.

(i) a. Did you buy the book you said you wanted yesterday?
   b. Yes, and I only bought that$_F$.
   c. Yes, and I not only bought that$_F$.

For whatever reason *only* is felicitous in such a context, we can attribute to the same reason the felicity of a *zhiyao*-conditional under the context of (34a).

Hence, the current proposal does not require conditional *jiu* to correlate with alternatives on a scale of entailment. The minimal sufficiency reading, which nonetheless is often available (especially when the antecedent clause or some constituent thereof is F-marked, as in (3a)), is derived through an independent mechanism to be discussed in the next section.

To illustrate how (32a) applies to a *jiu*-conditional, let me use (35a) as the first example, the counterpart of Wimmer's (7a) without *zhiyao*. According to the proposed analysis, (35a) is assigned the presupposition in (35b) and assertion in (35c). In other words, (35a) is felicitous if she is happy only under certain conditions, and states that every alternative conditional which is not entailed by the prejacent conditional is false. The terms "presupposition$_{jiu}$" and "assertion$_{jiu}$" indicate the presupposition and assertive content contributed by *jiu*, respectively.

(35) a. *San-zhi maomi lai, ta jiu kaixin.*
three-CL cat come she JIU happy
'If three cats come, she is happy.'
b. presupposition$_{jiu}$: $\exists p'[O[p' \rightarrow$ she is happy$]]$
c. assertion$_{jiu}$: $O[$3 cats come $\rightarrow$ she is happy$] = [$3 cats come $\rightarrow$ she is happy$]$
$\& \forall c \in C[[$[3 cats come $\rightarrow$ she is happy$] \not\subseteq c] \rightarrow \neg c]$

Since 'n cats come → she is happy' is not entailed by the prejacent if $n < 3$ (i.e., there is no guarantee that fewer than three cats will make her happy), the following alternatives in (36) are excluded by O_{JIU}. (In these alternatives, each p′ is also the negation of p, since if $n < 3$ then $n \neq 3$.)

(36) $\{$n cats come → she is happy $\mid n < 3\}$

The presupposition contributed by O_{JIU}, in effect, requires that there be a minimum condition for her happiness. This, again, is why [p, *jiu* q] cannot be uttered when q is known to be true regardless of the antecedent, as observed above (see (26)). The exhaustivity imposed by *jiu* ensures that a proposition as strong as the antecedent of *jiu*'s prejacent is needed for the consequent to be true. The oddity of the earlier Example (27b), whose presupposition and propositional content are (37b) and (37c), respectively ('Q' standing for a polar question operator), is also due to O_{JIU}.

(37) a. $Q[O_{JIU}$[it rains → this room doesn't leak]]
b. presupposition$_{jiu}$: $\exists p'[O[p' \rightarrow$ this room doesn't leak$]]$
c. propositional content$_{jiu}$: $Q[[$it rains → this room doesn't leak$] \& \forall c \in$
$C[[$[it rains → this room doesn't leak$] \not\subseteq c] \rightarrow \neg c]]$

Suppose the only relevant alternative of the antecedent '(if) it rains' is its negative alternative '(if) it doesn't rain'. Example (27b) asks whether it is true that: (i) if it

rains this room doesn't leak; and (ii) if it doesn't rain this room leaks (because the conditional [it doesn't rain → this room doesn't leak] is excluded by O_{JIU}). Since the second conjunct is itself odd, (27b) as a whole is odd. The same analysis explains why (28b) is infelicitous.

Finally, what the asserted AT LEAST component requires is that alternative conditional forms that are not entailed by [p → q] be false, not that p itself be lower than salient alternative propositions. Cases like (15b) and (16) are therefore expected, because in the first and second *jiu*-conditionals O_{JIU} can find appropriate alternatives to exclude.

As mentioned above, the AT LEAST component is not the minimal sufficiency reading of *jiu*-conditionals, the latter being the stronger interpretation that *nothing other than p is needed to verify q*. So, for instance, (35a) may also imply that it doesn't take more than three cats to make her happy. This minimal sufficiency reading obtains when the antecedent p or some constituent therein is F-marked, and crucially the reading does not come from O_{JIU}. In what follows, I show that it comes from another process of exhaustification, and *zhi(yao)* can be treated as an overt realization of the "outer" exhaustivity operator.

3.3 Recursive exhaustification and *zhi(yao)*

I propose that the minimal sufficiency reading of a *jiu*-conditional results from a strengthening process, in which [p, *jiu* q] falls under the scope of another exhaustivity operator O. O itself does not select for a particular type of proposition; it is freely available whenever appropriate. When O kicks in at the root level of a *jiu*-conditional, we obtain the "recursive exhaustification" form in (38), analogous to other cases discussed in Chierchia et al. (2012) and Chierchia (2013) where O applies to a constituent that is already exhaustified by an embedded O.

(38) $O[O_{JIU}[p \rightarrow q]]$

The covert O operator, again, has the semantics of *only* except that it is silent and does not presuppose its prejacent. Thus, the strengthened meaning in (38) asserts $O_{JIU}[p \rightarrow q]$ and excludes the alternatives which are not entailed by $O_{JIU}[p \rightarrow q]$; i.e. the members in C′ in (39a). Such alternatives are themselves "exhaustified" conditionals with the form $O_{JIU}[p' \rightarrow q]$ in which p′ entails p, because saying that there need to be at least three cats coming in order to make her happy does not entail that there need to be at least four or more cats coming. This is formalized in (39b): For every p′ that entails/is stronger than p, $O_{JIU}[p \rightarrow q]$ ('at least p must be true to make q true') does not entail $O_{JIU}[p' \rightarrow q]$ ('at least p′ must be true to make q true'). Thus, $O_{JIU}[p' \rightarrow q]$ gets excluded by O if p′ is stronger than p.

(39) a. $O[O_{JIU}[p \rightarrow q]] = O_{JIU}[p \rightarrow q] \,\&\, \forall c' \in C'[[O_{JIU}(p \rightarrow q) \not\subseteq c'] \rightarrow \neg c']$
b. $\forall p'[[p' \subset p] \rightarrow [O_{JIU}[p \rightarrow q] \not\subseteq O_{JIU}[p' \rightarrow q]]]$

Since every c′ is an exhaustified conditional where p′ entails p, the second conjunct in (39a) can be rewritten as (40a) below, and the C′ set can be represented as the propositions in (40b), assuming again that the numeral 'three' is F-marked.

(40) a. $\forall p'[[p' \subset p] \rightarrow \neg O_{JIU}[p' \rightarrow q]]$
b. {[n cats come → she is happy] & ¬[fewer than n cats come → she is happy] | $n > 3$}

Let us call (39a) or (40a) the AT MOST component of *jiu*-conditionals: *At most p is needed, or nothing beyond p needs to be true, in order to verify q*. This component arises as a result of strengthening when the antecedent p or some constituent therein gets F-marking.

Assuming the numeral 'three' is F-marked, the complete meaning of (35a), after strengthening by O, is (41): The *jiu*-conditional presupposes that some condition is needed for her to be happy, while asserting that (i) if three cats come, she is happy, (ii) there cannot be fewer/other than three cats to make her happy, and (iii) it's not true that at least four or more cats have to come in order to make her happy.

(41) a. presupposition$_{jiu}$: $\exists p'[O[p' \rightarrow$ she is happy$]]$ (= (35b))
b. assertion$_{jiu}$: [3 cats come → she is happy] & $\forall c \in C[[[$3 cats come → she is happy$] \not\subseteq c] \rightarrow \neg c]$ (= (35c))
c. (strengthened) assertion$_O$: (41b) & $\forall p' \in C'[[p' \subset$ 3 cats come$] \rightarrow \neg O_{JIU}[p' \rightarrow$ she is happy$]]$

Obviously, p′ in (40a) need not be a proposition that differs from p ('three cats come') only in the numeral. All that is required is that p′ entails p. Thus, p′ could be any of the propositions in (42), as long as it is known that she likes dogs and rabbits as well; i.e., the stronger alternatives have to be consistent with the relevant modal base. If she dislikes snakes, then (43) would not constitute a relevant alternative for (40a), even though (43) does entail p.

(42) a. 3 cats and 1 dog come
b. 3 cats and 2 dogs come
c. 3 cats and 1 rabbit come

(43) 3 cats and 1 snake come

The proposal that O_{JIU} operates on alternative conditional forms [p′ → q], instead of just alternatives of p, guarantees that alternatives relevant to a *jiu*-conditional is properly constrained (by a contextual modal base).

A reviewer asks how this analysis explains cases where alternatives are constructed not based on entailment but on a pragmatic scale; e.g. the case of (13c) (from Wimmer 2020). For Wimmer, *zhi*'s lowness presupposition need not be entailment-based and can work with (13c), even though *jiu* plays no role; by contrast, in my proposal there is no lowness condition that is separate from logical strength and the exclusivity of both O and O_{JIU} is entailment-based. However, although the alternatives in (13c) do not differ in logical strength, this is independent of the main proposal of this work because the arguments of O and O_{JIU} are complete conditional structures, not just conditional antecedents, for *jiu*-conditionals. For (44a), the alternatives relevant to the exclusivity of *jiu* are those in (44b) instead of (13c). The assertive content of (44a) is (44c). As before, the exclusive component rules out conditionals that are not entailed by the prejacent [you smile → I'll be happy]. Since the prejacent does not entail [you do nothing → I'll be happy], the latter is false; at least you need to smile to make me happy.

(44) a. $[Ni\ xiao]_F$, *wo jiu kaixin le.*
you smile I JIU happy ASP
'If you smile, I'll be happy.'
b. C = {you smile → I'll be happy, you bake a cake → I'll be happy, you take me to Paris → I'll be happy}
c. assertion$_{jiu}$: [you smile → I'll be happy] & ∀c ∈ C[[[you smile → I'll be happy] ⊈ c] → ¬c]

But since the prejacent also does not entail [you bake a cake → I'll be happy] or [you take me to Paris → I'll be happy], does not (44b) require such alternatives to be false as well? If it does, then (44a) would imply the falsity of these alternatives, which is counterintuitive.

I see two ways to tackle this problem. The first is to modify the relevant alternatives: We may assume that the C set for (44a) is not (44c) but rather (45) below, where the antecedents of the alternative conditionals all take a conjunctive form and therefore are all logically stronger than the antecedent of the prejacent (see Wimmer 2020: 70). When O_{JIU} applies to the prejacent, nothing in (45) is eliminated because every alternative is entailed by the prejacent. This is a welcome result, as the alternatives "surviving" O_{JIU}'s exhaustification can be "used" in O's exhaustification if O is inserted to strengthen $O_{JIU}[p \rightarrow q]$, yielding the desired AT MOST component.

(45) C = {you smile → I'll be happy, you smile & you bake a cake → I'll be happy, you smile & you take me to Paris → I'll be happy, …}

The second way is to maintain the structure of the alternatives in (44b), but define a variant of O which can order these alternatives. Note that both [you bake a cake → I'll be happy] and [you take me to Paris → I'll be happy] are *more likely than* [you smile → I'll be happy]; i.e., they can be ordered on a scale of likelihood. If we can define a "strictly scalar" version of O for the entry of *jiu*/O_{JIU} so that the assertive content of *jiu*/O_{JIU} is the exhaustification over alternative conditional forms which are *less likely than* the prejacent, i.e., (46) (the only difference from (44c) being the change from logical entailment to a likelihood-based ordering relation), then it can be explained how (44a) gives rise to the minimal sufficiency reading with the C set in (44b).

(46) assertion$_{jiu}$ (with a "scalar O"): [you smile → I'll be happy] & $\forall c \in C[[[$you smile → I'll be happy$] \not\leq_{likely} c] \rightarrow \neg c]$

Such a strictly scalar exhaustivity operator has in fact been proposed by Xiang (2020), who postulates the "JUST" operator in (47) as part of the denotation for the Mandarin scalar particle *dou* on its scalar use. In prose, JUST(q) asserts the prejacent q and the exhaustivity component that every alternative that is less likely (rather than non-weaker) than q is false; i.e., among the true alternatives q is the least likely one.

(47) $\text{JUST}_C(q) = \lambda w: q(w) = 1 \wedge \forall r \in C[r(w) = 1 \rightarrow q \leq_{likely} r]$ (Xiang 2020: 200)

The JUST operator is precisely what we need to derive (46) if we apply it to (44a). Assuming the set (44b), replacing O with JUST in *jiu*'s denotation will once again be vacuous because the alternatives which are distinct from the prejacent are more likely than the latter; e.g., [you bake a cake → I'll be happy] is more likely than [you smile → I'll be happy]. Thus, nothing gets excluded by JUST. But if O kicks in again at the root level, we obtain the same AT MOST component as before, because JUST[you smile → I'll be happy] is true, while JUST[you bake a cake → I'll be happy] and JUST[you take me to Paris → I'll be happy] are both false. That is, neither of [you bake a cake → I'll be happy] and [you take me to Paris → I'll be happy] is the least likely conditional in the set (44b). In effect, O-strengthening ensures that none of the alternatives in (44b) other than *jiu*'s prejacent is the least likely one in (44b). This is the AT MOST component of a strengthened *jiu*-conditional where alternatives are ranked on a pragmatic scale: Saying that *jiu*'s prejacent is the least likely true member in (44b) amounts to saying that among smiling, baking a cake, and taking me to Paris, you at most need to do what is least likely to make me happy in order to make me happy.

Based on the considerations above, I conclude that for a *jiu*-conditional in which the antecedent proposition and its alternatives form a pragmatic scale, my

proposal works as well if the alternative structure is adjusted to something like (45) or if the entailment-based O shifts to the likelihood-based JUST in (47).[12]

In short, I have claimed that conditional *jiu* is an exhaustivity operator O_{JIU} over a conditional, and a *jiu*-conditional [p, *jiu* q] is subject to further strengthening by the covert exhaustivity operator O scoping over O_{JIU}. O_{JIU} excludes alternatives of [p → q] which are not entailed by [p → q], whereas O rules out "pre-exhaustified" alternatives which are not entailed by O_{JIU}[p → q]. The overall effect of recursive exhaustification by O_{JIU} and O is that *q is true if at least p is true* — the AT LEAST component, and *nothing beyond p is required to be true* — the AT MOST component. The latter is the source of minimal sufficiency. Furthermore, there are different ways of dealing with cases where the relevant scale for O_{JIU} is a pragmatic one.

On the other hand, the *zhiyao*-conditional (48) in the same context is perceived as a stronger claim than (34b) and implies that it takes nothing more than 'it rains tomorrow' to verify the consequent (see also Footnote 9). That is, the presence of *zhiyao* obligatorily places the antecedent in a lowest scalar position.

(48) Context: Same as (34).
Zhi-yao mingtian xiayu, *women jiu bu qu le*.
only-need tomorrow rain we JIU not go ASP
'As long as it rains tomorrow, we won't go (hiking).'

This behavior of *zhiyao* would be expected if it is a marker signaling the presence of a higher O operator above *jiu*. That is, a *zhiyao*-conditional differs minimally from a *jiu*-conditional in that O obligatorily applies to the former but not to the latter, as summarized in (49).

(49) a. p, *jiu* q: exhaustification by O_{JIU} obligatory, exhaustification by O optional (the latter depending on whether p or some subconstituent thereof is F-marked)
b. *zhiyao* p, *jiu* q: exhaustification by O_{JIU} obligatory, exhaustification by O obligatory

Specifically, I propose that *zhi* in *zhiyao* syntactically surfaces inside a conditional antecedent and agrees with the covert exhaustification operator at the root level,

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12. Although the grammatical view of scalar implicature (e.g. Chierchia et al. 2012) does not focus on the scalar reading of O, O may very well have a scalar counterpart that operates on a contextual (rather than entailment-based) scale: If someone says "John is an employee" (in response to a question about John's job), it is natural that we understand it to mean that John is *only*/*just* an employee and not of a higher rank, say, a director. In other words, scalar implicature can arise with the rank-order reading (Coppock & Beaver 2014), in addition to the familiar one based on logical strength.

as in (50a). That is, *zhi* is an overt agreement marker with the covert O. Such an agreement pattern is similar to that between a (possibly covert) negative operator and a negative indefinite interpreted as an existential phrase in negative concord languages.[13] On the semantic side, (50a) presupposes (50b) (at least some p′ must be true to make q true), and asserts both (50c), the AT LEAST component, and (50d), the AT MOST component.

(50) a. $O[[\textit{zhiyao}\ p]_{\text{antecedent}}\ [\textit{jiu}\ q]_{\text{consequent}}]$
b. $\text{presupposition}_{\textit{jiu}}$: $\exists p'[O[p' \rightarrow q]]$
c. $\text{assertion}_{\textit{jiu}}$: $O[p \rightarrow q]$
d. $\text{assertion}_{\textit{zhiyao}}$: $O[O_{\text{JIU}}[p \rightarrow q]]$

On the other hand, the modal morpheme *yao*, as mentioned earlier, appears not only in *zhiyao*-conditionals but also in other types of conditional antecedents in Mandarin, and for this reason I shall assume *yao* has become a grammaticalized element without inherent modality and will simply take it to be semantically vacuous.[14]

This analysis of *zhiyao* as sketched in (50) is appealing for a number of reasons. First, *zhi* is literally 'only'; the connection between *zhiyao* and an exhaustivity operator is quite intuitive. Second, it explains why, as Wimmer (2022: 433) comments briefly, the presence of *jiu* alone suffices to license minimal sufficiency while *zhiyao* seems to just impose "additivity" on top of that: A *jiu*-conditional can be optionally strengthened by O, which derives minimal sufficiency (AT MOST), and when *zhiyao* is inserted, the same effect becomes obligatory.[15] How-

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13. One such example is (i) from Czech, where both the finite verb *nevidi* and indefinite object *nikoho* are marked for negation. Zeijlstra (2004) analyzes the negative concord phenomenon as agreement between a covert negative operator $Op_{\neg}$ on the one hand and the finite verb and object on the other hand, as schematized in (ii) (the object undergoes movement for independent reasons). The uninterpretable features are deleted under Agree and c-command.

(i) *Milan nevidi nikoho.*
Milan NEG.sees n-body
'Milan doesn't see anybody.' (Zeijlstra 2004: 250)

(ii) $[_{\text{NegP}}\ Op_{\neg[\text{iNEG}]}\ [_{\text{vP}}\ \textit{nikoho}_{[\text{\sout{uNEG}}]}\ [_{\text{vP}}\ \text{Milan}\ [_{\text{v}}\ \textit{nevidi}_{[\text{\sout{uNEG}}]}]]]]$

The analogy drawn here is that *zhiyao* is similar to the overt negative marking on the verb/object in (i), which syntactically agrees with the covert O, the latter akin to the covert negative operator $Op_{\neg}$.

14. See Kuo (2024: 391) for a brief discussion on the grammaticalization of *yao* from a modal to a conditional marker.

15. As discussed above, what Wimmer refers to as additivity in *zhiyao*-conditionals is nothing more than the DE property of conditional antecedents: $[p \rightarrow q]$ entails $[p' \rightarrow q]$ if $p' \subseteq p$.

ever, according to the current account, no additivity in the semantics of *zhiyao*-conditionals needs to be derived separately; the inference that alternatives stronger than the antecedent will also verify that the consequent can be analyzed as an implicature of the AT MOST component as a consequence of O's strengthening, roughly along the following lines: If it is not the case that only some stronger p′ can make q true, it is reasonable for one to infer that p′ will also make q true, namely (51).[16]

(51) $\forall p'[[p' \subset p] \rightarrow \neg O_{JIU}[p' \rightarrow q]] \rightsquigarrow [p' \rightarrow q]$ ("$\rightsquigarrow$" for "implicate")

For example, the statement (52a) implicates (52b). I assume this is a case of standard quantity/scalar implicature similar to the one that can be easily inferred from the sentence *To get to the City Hall, you don't need to take a cab*. Here, the scalar implicature is that you can also take a cab to get to the City Hall.

(52) a. It is not the true that at least 4 (or more) cats must come in order to make me happy.
b. If at least 4 (or more) cats come, this will also make me happy.

As Wimmer also correctly notices, such an "additivity" inference is cancellable:[17]

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16. A reviewer comments that the same additive inference is also compatible with a *jiu*-conditional, which has no O/*zhiyao*, since *jiu*'s semantics does not say anything about stronger alternatives. But here it is an implicature with O/*zhiyao*, which can be cancelled. This raises the question of whether a competition is predicted between the two types of conditionals in contexts of additivity. I think not: Since additivity is an implicature for both conditionals, when additivity is compatible with the context both conditionals should be felicitous. This holds true for English *if*- and *as long as*-conditionals as well: In the context in (i), both (i.a) and (i.b) seem appropriate.

(i) Context: I am happy to clean the bathroom if you give me $ 50 or more.
a. If you give me $ 50, I will clean the bathroom.
b. As long as you give me $ 50, I will clean the bathroom.

17. As far as I can see, this implicature may arise with both *zhiyao*-conditionals and *jiu*-conditionals, and cancellation of it is possible regardless of the F-marked constituent is within p. Thus, both the first *zhiyao*-conditional in (i.a) and the first *jiu*-conditional in (i.b) can be followed by the given continuation clause.

(i) a. *Zhi-yao san$_F$-zhi mao lai, wo jiu kaixin; dan si$_F$-zhi mao lai, wo jiu bu kaixin le.*
only-need three-CL cat come I JIU happy but four-CL cat come I JIU not happy ASP
'As long as 3 cats come, I will be happy; but if 4 cats come, I won't be happy.'

(53) *Zhi-yao Mali lai, wo jiu kaixin. Dan Mali he Yuehan yiqi lai, wo jiu bu kaixin le.*
only-need Mary come I JIU happy but Mary and John together come I JIU not happy ASP
'As long as Mary comes, I am happy. But if Mary and John come together, I won't be happy.' (Wimmer 2022: 425)

This is, of course, expected if [p′ → q] (where p′ is stronger than p) is just a conversational implicature arising from the AT MOST component.

Finally, unlike Wimmer's approach, which requires an inverted LF structure for *zhiyao*-conditionals (where *zhi* scopes below *yao*) along with a covert *even* to derive minimal sufficiency, the present proposal is scope-isomorphic: *Zhiyao* indicates that higher O takes scope over the entire (pre-exhaustified) conditional structure, hence avoiding the mismatching problem, and moreover there is no need to posit a covert scalar operator (such as *even*) which is semantically distinct from the O-type exhaustivity operator. This makes our theory simpler and more elegant. At the same time, the scalar lowness of *zhiyao*, which Wimmer stipulates as its presupposition, is now derived in a principled manner as well: If the function of *zhiyao* is to rule out (pre-exhaustified) alternatives that contain a stronger antecedent, it follows that the antecedent p in a *zhiyao*-conditional is lower/weaker than alternative antecedent propositions. In other words, scalar lowness is a by-product of exhaustification by O.

Given the present account, the *zhiyao*-conditional in (54a) below is assigned the same semantics as the *jiu*-conditional in (35a) when O applies obligatorily to the latter. Example (54a) therefore presupposes (54b), and asserts both (54c) (the AT LEAST component) and (54d) (the AT MOST component).

(54) a. *Zhi-yao san-zhi maomi lai, ta jiu kaixin.*
only-need three-CL cat come she JIU happy
'As long as three cats come, she is happy.'
b. presupposition$_{jiu}$: ∃p′[O[p′ → she is happy]]
c. assertion$_{jiu}$: [3 cats come → she is happy] & ∀c ∈ C[[[3 cats come → she is happy] ⊈ c] → ¬c]

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b. *San$_F$-zhi mao lai, wo jiu kaixin; dan si$_F$-zhi mao lai, wo jiu bu kaixin le.*
three-CL cat come I JIU happy but four-CL cat come I JIU not happy ASP
'3 cats come, I will be happy; but 4 cats come, I won't be happy.'

This is predicted by the proposed analysis: Saying that no more than 3 cats are needed to please me, does not entail that I will be pleased by 4 cats or more. This also holds true for the first *jiu*-conditional in (i.b), which simply asserts that at least 3 cats are required to make me happy, leaving it open whether I will be happy or not if 4 cats come. I thank a reviewer who suggested this clarification.

d. assertion$_{zhiyao}$: (54c) & $\forall p' \in C'[[p' \subset$ 3 cats come$] \rightarrow \neg O_{JIU}[p' \rightarrow$ she is happy$]]$

Here is the analysis applied to the watermelon example in (15b), repeated below as (55a). Our focus is the instance of *zhiyao* and *jiu* in the second *zhiyao*-conditional, the semantics of which is decomposed into (55b), (55c), and (55d), respectively.

(55) Context: There are five watermelons in front of us.

a. *Zhi-yao ni chi-wan* [*yi-ke xigua*]$_F$, *wo jiu gei ni shi yuan.*
only-need you eat-finish one-CL watermelon I JIU give you ten dollar
Erqie bu zhi zhe-yang.
and not only this-manner
Zhi-yao ni chi-wan [*wu-ke xigua*]$_F$, *wo jiu gei ni wushi yuan.*
only-need you eat-finish five-CL watermelon I JIU give you fifty dollar
'As long as you finish one watermelon, I will give you ten dollars. And not just that. As long as you finish five watermelons, I will give you fifty dollars.'

b. presupposition$_{jiu}$: $\exists p'[O[p' \rightarrow$ I will give you \$ 50$]]$

c. assertion$_{jiu}$: [you finish 5 watermelons $\rightarrow$ I will give you \$ 50] & $\forall c \in C[[$[you finish 5 watermelons $\rightarrow$ I will give you \$ 50] $\not\subseteq c] \rightarrow \neg c]$

d. assertion$_{zhiyao}$: (55c) & $\forall p' \in C'[[p' \subset$ you finish 5 watermelons$] \rightarrow \neg O_{JIU}[p' \rightarrow$ I will give you \$ 50$]]$

Since there are exactly five watermelons in the context, stronger alternatives than 'you finish 5 watermelons' cannot be obtained by substituting the numeral with a higher value. Instead, sensible alternatives relevant to (55d) should be, for instance, those in (56). That is, *zhiyao* always requires a set of stronger alternatives to be introduced and then eliminated.

(56) {you finish 5 watermelons in 5 minutes, you finish 5 watermelons in 10 minutes, …}

Assuming (56), *zhi(yao)* asserts that your finishing 5 watermelons is the least condition that needs to be satisfied in order for me to give you \$ 50 (namely (55c)), and in addition none of the propositions in (56) constitutes the least-required condition for the truth of 'I will give you \$ 50', thus leading to the interpretation that I will give you \$ 50 as long as you finish five watermelons, regardless of how much time it takes for you to do so. Note that the alternatives in (56) do not differ in the quantity of watermelons. This explains why the second *zhiyao*-conditional in (55a) is consistent with the first, despite the presence of *zhiyao*: The O operator introduced by *zhiyao* operates on alternatives with a complete conditional form (including the consequent), rather than the antecedent alone, and thus the second

zhiyao-conditional is fine because the relevant alternatives are those in (56) (for instance), rather than those with different quantities of watermelons.[18]

As the last example, (14), repeated below as (57a), can be analyzed similarly.[19]

(57) a. *Zhi-yao shuo-huang, jiu (shi) bu dui.*
only-need tell-lie JIU be not right
'As long as one lies, it is wrong.'
b. presupposition$_{jiu}$: $\exists p'[O[p' \rightarrow$ it is wrong$]]$
c. assertion$_{jiu}$: [one lies → it is wrong] & $\forall c \in C[[[$one lies → it is wrong$] \notin c] \rightarrow \neg c]$
d. assertion$_{zhiyao}$: (57c) & $\forall p' \in C'[[p' \subset$ one lies$] \rightarrow \neg O_{JIU}[p' \rightarrow$ it is wrong$]]$

The presupposition due to *jiu* in (57b) states that not everything is considered wrongdoing; only certain behaviors are. *Jiu* also asserts that: (i) if one lies, that is wrong; and (ii) all alternative conditional forms not entailed by (i) are excluded; e.g. 'if one is honest, it is wrong'. Finally, *zhi(yao)* asserts that nothing beyond telling a lie constitutes the least-required condition for being wrong. This latter assertion rules out alternatives in, say, (58), as such least-required conditions.

(58) {one lies with a good intent, one lies with a malicious intent, …}

3.4 Obligatoriness of *jiu* and Maximize Presupposition

The last issue to be addressed in this paper is a long-standing observation (e.g. Hole 2004) is that *jiu* is obligatory in *zhiyao*-conditionals, as in Example (59).

(59) *Zhi-yao* $[ni\ lai]_F$, *wo *(jiu) hui qu.*
only-need you come I JIU will go
'If you come, I will go.' (Hole 2004: 69)

This observation, to my knowledge, has never been explained before. I would like to argue that the obligatoriness of *jiu* in *zhiyao*-conditionals is due to the principle of Maximize Presupposition (Heim 1991), which, in its general form, states that for two competing propositions with the same truth-conditional content, a speaker should choose the one with a stronger presupposition compatible with the common ground. With *jiu*, (59) carries the presupposition in (60), an exis-

18. The case of (16) (in the "three questions" scenario) can be handled in a similar way by allowing *zhiyao*'s C′ variable to include the set of propositions {you answer the third question correctly in t}, t being a variable over time intervals. The role of *zhiyao* is to rule out the alternatives which entail 'you answer the third question correctly', so that only the latter qualifies as the least-required condition verifying the consequent 'you will win the prize'.

19. I abstract away from the reference of the implicit pronominal in the consequent clause.

tential claim that some proposition qualifies as the lower-bound condition for the truth of 'I will go'.

(60) $\exists p'[O[p' \rightarrow \text{I will go}]]$ (presupposition contributed by *jiu* in (59))

Recall that *zhiyao* in the present analysis is nothing but the marker of a covert O operator at the root level, the existence of which does not depend on *jiu*/O_{JIU}. Hence, (59) would still be interpreted if *jiu* is removed, in which case its semantics is simply (61), i.e. the same assertive content as (59) with *jiu* but without *zhiyao*.

(61) $O[\text{you come} \rightarrow \text{I will go}]$

However, since (61) does not presuppose (60) (because O is not presuppositional), the counterpart of (59) without *jiu* is ruled out as per Maximize Presupposition (if the context satisfies the existential presupposition). The obligatoriness of *jiu* in a *zhiyao*-conditional is therefore accounted for.

In contrast, removing *jiu* from a *jiu*-conditional may still result in a grammatical conditional sentence (though one without *jiu*'s existential presupposition). We have seen one example in (26b); (62) below is another.

(62) *Ni bang ta, ta hui ganxie ni. Ni bu bang ta, ta ye hui ganxie ni.*
you help he he will thank you you not help he he also will thank you
'If you help him, he will thank you. If you don't help him, he will also thank you.'

If *jiu*'s contribution is the at-issue AT LEAST component and an existential presupposition, as I have argued, then it is not surprising that dropping *jiu* does not affect the conditional interpretation of either statement in (62). This observation demonstrates once again that *jiu* itself is not a "conditional marker", but rather an exhaustivity operator over a conditional structure.

4. Comparison with previous accounts on conditional *jiu*

In this section, I critically review two other recent semantic accounts of *jiu*, Liu (2017a) and Liu & Wang (2022), both of which are related to the current proposal in one way or another. However, as neither of them addresses the same range of facts as this work, the discussion of each study will be brief and I can only refer readers to the original works for further details. For other treatments, see Biq (1988), Lai (1999), Hole (2004), and Zhang & Ling (2017).

4.1 Liu (2017a)

Liu (2017a) bases his analysis of *jiu* partly on Liu's (2017b) account of *jiu* as a "weak *only*" (which excludes focus alternatives that asymmetrically entail its prejacent), and partly on Klinedinst & Rothschild's (2012) account on the conditional use of the conjunction *and* (as in *The cops show up, and a fight will break out*). The function of *and*, according to Klinedinst & Rothschild, is to shift the context for the second (i.e. consequent) clause so that it is interpreted with respect to the worlds in which the first (i.e. antecedent) clause is true. Due to independent principles which will not be discussed here, the conjunctive form [p *and* q] would receive a conditional interpretation only if q is inherently modalized. Following this approach, Liu (2017a) proposes that [p, *jiu* q] in Mandarin has the LF in (63), where (i) p is F-marked, (ii) *jiu* is a weak *only* that scopes over a conjunction containing a covert *and*, and (iii) $\Box$ is a necessity modal operator in the consequent clause. The conjunctive (&) interpretation of *and* is banned as a result of *jiu*'s (weak) exclusivity.

(63) *jiu* [p_F and [$\Box$ q]]

In other words, Liu assumes that [p, *jiu* q] has a coordination syntax headed by a silent equivalent of the English *and*; the latter is ambiguous between the conjunctive and conditional use, while Mandarin *jiu* is compatible only with the conditional *and*.

One issue with Liu (2017a) is that the covert *and* in Mandarin does not seem independently motivated. The juxtaposition of two clauses may actually have a subordination structure (where one clause is an adjunct inside the other), rather than coordination. Thus, the assumption that [p, *jiu* q] has the configuration [p, *and* q] is not uncontroversial. Empirically, the coordination marker for clauses in Mandarin is *erqie* (Li 2001), as shown in (64), which can never be interpreted as a conditional.

(64) *Wo xihuan ta*, *erqie Zhangsan ye xihuan ta.*
I like he and Zhangsan also like he
'I like him and Zhangsan also likes him.' (Li 2001: 178)

While this is by no means a knock-down argument against Liu (2017a) (because coordinators may behave differently across languages, as a reviewer remarks), one should keep in mind that Klinedinst & Rothschild's (2012) theory was motivated in part by a close relationship between the two kinds of *and* in English; i.e., for both of them the second conjunct is interpreted with respect to the worlds in which the first conjunct is true. If Mandarin does not possess an overt coordinator that shows the same pattern, then one may just as well simply posit a modal or

conditional component in [p, *jiu* q] without assuming the presence of any coordinator.

Second, Liu does not discuss *zhiyao* and the minimal sufficiency reading, either; and it is unclear how his coordination-based account can explain the minimal sufficiency semantics of [p, *jiu* q] when p or a subconstituent of p is focused, or when *zhiyao* is present. While his theory also has *jiu* taking scope over both p and (a modalized) q, *jiu* needs to be treated as distinct from *only*, and the theory lacks the presuppositional component in (32a) as well as recursive exhaustification by a second O.

4.2 Liu & Wang (2022)

In their recent work, Liu & Wang (2022) outline a unifying analysis for the conditional *jiu* and the *jiu* that is associated with a focus on its left. Examples (65) and (66) below exemplify two cases of the focal *jiu*, which Liu & Wang argue contributes nothing to this assertion but triggers a scalar implicature (SI) in terms of likelihood. Roughly, the SI triggered by *jiu* is that the prejacent clause is less likely than alternative propositions in which the left associate of *jiu* is replaced by relevant alternatives.

(65) *Zhangsan*$_F$ *jiu chi-le yi-zhi ji.*
Zhangsan JIU eat-ASP one-CL chicken
'Zhangsan ate a chicken.'
a. Assertion: Zhangsan ate a chicken.
b. SI: It is less likely that Zhangsan ate a chicken alone than with someone else.

(66) *Tamen xianzai*$_F$ *jiu qu.*
they now JIU go
'They will go now.'
a. Assertion: They are going now.
b. SI: It is less likely that they are going now than at later points in time.

Liu & Wang take the conditional *jiu* to be the same instance of *jiu*, and suggest that the *jiu*-conditional in (67) also conveys a similar SI, according to which the *jiu*-conditional itself is less likely than alternative conditionals.

(67) *Zhe-ge wenti ruguo* [*you ren lai*]$_F$ *jiu jiejue le.*
this-CL problem if have person come JIU solve ASP
'If someone comes, this problem will be solved.'
a. Assertion: If someone comes, this problem will be solved.

b. SI: It is less likely that the problem gets solved with someone coming than with more than one person coming (or other contextual alternatives).
(Liu & Wang 2022: 441)

One problem to Liu & Wang's approach is that it is not compositional; as they do not offer a formal definition for *jiu* itself, it is unclear how the claimed SI is derived in a principled manner. In particular, although Liu & Wang do not use the superlative "least likely" in their paraphrase of *jiu*'s SI component, the SI as they describe it appears to be identical to the scalar presupposition of *even*. But the readings of the examples in (65) to (67) do not involve *even*; Example (67), for instance, does not seem paraphrasable by (68).[20]

(68) Even if (only) someone/one person comes, this problem will be solved.

Importantly, the minimal sufficiency reading associated with *jiu* is not identical to the scalar reading assigned by Liu & Wang. What (67) conveys is actually that solving this problem does not require more than a person; this does not entail that a person coming is less likely than more people coming. Lastly, Liu & Wang do not address the role of *zhiyao*, either, and hence cannot answer the question of why the minimal sufficiency reading of *jiu*-conditional is somehow related to exclusive focus.

5. Conclusion

This paper contributes to the understanding of the conditional *jiu* and how it interacts with *zhiyao* in delivering minimal sufficiency. I have proposed that the conditional *jiu* is O_{JIU}, an overt exhaustivity operator which selects a conditional structure [p → q] (resulting in the AT LEAST component) and carries the existential presupposition that at least some proposition p′ needs to be true for q to be true. When the antecedent p or a subconstituent thereof is F-marked, a *jiu*-conditional is subject to strengthening by another exhaustivity O at the root level, which is covert and functions to exclude alternatives not entailed by O_{JIU}[p → q]. This derives the AT MOST component or minimal sufficiency reading of *jiu*-conditionals as discussed at length by Wimmer (2022). The role of *zhiyao* in a *zhiyao*-conditional is analyzed as an agreement marker signaling the presence of O, and this explains why a *zhiyao*-conditional has the same interpretation as a *jiu*-conditional where (a subpart of) p is F-marked.

20. Wimmer's (2022) account faces the same problem as well, where a covert *even* is posited on top of a *zhiyao*-conditional, as reviewed in § 2.

This proposal has four merits. First, it explains why *jiu* alone (without *zhiyao*) licenses the minimal sufficiency reading and scalar lowness of a *jiu*-conditional, and why *jiu* works in harmony with *zhiyao*. Second, since *jiu*'s semantics takes the entire conditional structure [p → q] into account, not just the antecedent, the members of the scale on which the antecedent p is a member are constrained by the conversational backgrounds of the relevant modal, and p isn't just lower/weaker than any alternative that logically or pragmatically entails it but only those that logically entail it *and* are compatible with the relevant conversational backgrounds. This explains why the antecedent of a *jiu*-conditional or a *zhiyao*-conditional need not be lowest relative to alternatives. Third, disentangling minimal sufficiency, or the AT MOST component, from the assertive content of *jiu* allows a *jiu*-conditional to not require this component, which is a welcome result because a *jiu*-conditional does not always express minimal sufficiency. Finally, since *jiu* is presuppositional, the fact that *zhiyao* requires co-occurrence of *jiu* can be attributed to Heim's (1991) principle of Maximize Presupposition.

There are, of course, many questions about *jiu* that I have not addressed in this paper. One of them is why *jiu* can also occur in other kinds of contexts; e.g. (65) and (66) cited above. The obvious obstacle of applying the present account to such examples is that they do not have a conditional syntax, nor do they exhibit a conditional interpretation. Another is that, as is well known, *jiu* has another life as a (stressed) exclusive focus-like particle in association with a focal constituent to its right (not left), e.g. (69).

(69) *Jiu Zhangsan hui lai.*
JIU Zhangsan will come
'Only Zhangsan will come.'

Whether this type of *jiu* can be unified with the *jiu* discussed in this paper through the same approach must be left for future investigation (see Liu (2017b) for the idea that *jiu* uniformly expresses "weak *only*" and gives rise to different readings depending on the variety of alternatives it interacts with).

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List of abbreviations

ASP	aspectual marker	neg-raising	negative raising
CL	classifier	QUD	Question Under Discussion
DE	downward-entailing	SFP	sentence-final particle
LF	Logical Form	SI	scalar implicature
NEG	negative marker		

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