Capturing Modal Base Polarity with Mandarin *wh*-indefinites

Overview: Mandarin *wh*-words occur as polarity-sensitive indefinites, which are licensed by epistemic expressions and negation, but not by deontic modals or other downward entailing operators. Previous analyses based on scalar strength reversal do not have an explicit mechanism for accounting for subtle distributional differences between different types of non-veridical environments. We propose Mandarin *wh*-indefinites have an epistemic uncertainty presupposition that contradicts the semantics of an assert operator (Alonso-Ovalle and Menéndez-Benito, 2011), unless intervened by non-veridical operators. By invoking Hacquard's (2010), we explain general licensing by epistemic, and not deontic, modals as a requirement that event arguments for presuppositions of *wh*-indefinites be interpretable only above aspectual markers, consequently compatible with semantic scope below epistemic operators but above deontic operators.

Background: Mandarin *wh*-words have epistemic indefinite readings in a restricted set of semantic environments, including the scope of negation and epistemic expressions (Li, 1992; Lin, 1998). When licensed, they express a speaker's non-commitment to a referent's existence in the speaker's epistemic worlds, i.e. the identity is unknown or insignificant for the listener. This reading is available for *shenme* 'what' in (1) that nothing significant known is eaten. These *wh*-indefinites are curious in their incomplete resemblance to polarity-sensitive items cross-linguistically, licensed by epistemic attitude verbs and necessity modals, as in (2), and in not being licensed by deontic modals, as in (3), regardless of modal force (Lin, 1998).

(1) [wo] mei mai shenme, (jiu yi-zhi bi)
[I] not buy what just one-CL pen
'[I bought] Nothing in particular, just a pen.' (Dong, 2009, 141)

(2) Xiaohong kending/keneng jian-le shei, buran bu hui lian hong.
Xiaohong definitely/probably see-PERF who, otherwise not will face red.
' Xiaohong definitely/probably saw someone special, otherwise she wouldn't blush.'

(3) # an shenqin guiding, ni bixu/keyi zhao shei qianzi
according application rules, you must/can find who sign.
'According to rules of application, you must have a particular someone's signature.'

Previous Analyses: Most recently, Mandarin *wh*-indefinites have been analyzed as epistemic indefinites that obligatorily activate potentially conflicting implicatures (Chierchia and Liao, 2015; Liu, 2019), with the uttered sentence, or with one another, in the coherence of their propositions. The conflict derives context-dependent unacceptability for *wh*-indefinites, as desired.

Distribution predictions: These accounts have indeed explained well the derivation of insignificant readings. However, these analyses are too strong, since they predict Mandarin *wh*-indefinites to be licensed in downward entailing environments generally, whereas they are not licensed in many of these environments beyond negation (Lin, 1998). For example, they are not licensed in the restriction of universal quantifiers, as observed in (4), where *shei* 'who' occurs in the restriction clause of the quantifier *suoyou* 'every' to produce an infelicitous sentence. These analyses also do not predict the licensing of Mandarin *wh*-indefinites by epistemic necessity modals or epistemic attitude verbs, nor the lack of licensing by deontic modals.

(4) # suoyou jian le shei de ren jueding congxin kaolü
everyone see PERF who MOD person decide anew consider
('Everyone who has seen anyone (special) wants to reconsider.')

Proposal: To capture the basic licensing patterns, *wh*-indefinites are modeled to require occurrence under the scope of non-veridical operators, i.e., operators that do not entail the truth of embedded propositions. More precisely, Mandarin *wh*-indefinites like *shei* 'who' are existential quantifiers with a presupposition

that the speaker does not commit to the proposition formed with the *wh*-indefinite. Assuming Hacquard's (2010) analysis of modal bases with Davidsonian event arguments, speaker commitment to a proposition p is modeled as universal quantification over $\textsc{info-state}(e)$, the worlds consistent with speaker knowledge in a speech event e, in its verification of p. The presupposition is then the negation of this speaker commitment, as in (5). Declarative sentences also come with an operator $\textsc{assert}(e_0)$ that marks the sentence as an assertion and applies non-negated universal quantification over $\textsc{info-state}(e_0)$ in its verification of p, as in (6). Mandarin *wh*-indefinites are then only licensed when the presupposition does not entail the negation of the assertion. In a sentence without non-veridical operators, like (7), the presupposition and assertion come into inferential conflict, deriving unacceptability of *wh*-indefinite *shei* 'who'.

(5) $[\![\text{shei}]\!] = P_{\langle e,p\rangle}\lambda e_v \lambda w_s : \neg\forall w'_s \in \textsc{info-state}(e)\exists x_e[\textsc{person}(x,w') \wedge P(x,w')]$
$.\exists x_e[\textsc{person}(x,w) \wedge P(x,w)]$

(6) $[\![\textsc{assert}(e_0)]\!] = \lambda p_p \lambda w_s.\text{Assert}(e_0,w) \wedge \forall w'_s \in \textsc{info-state}(e_0)[p(e_0,w') = 1]$

(7) $[\![\text{Liping invited shei.}]\!] = [\![\textsc{assert}(e_0)]\!]([\![\text{shei}]\!]([\![\text{Liping invited } x.]\!])) =$

a. $\lambda w_s : \neg\forall w'_s \in \textsc{info-state}(e_0)\exists x_e[\textsc{person}(x,w') \wedge \textsc{invited}(l,x,w')]$
$.\text{Assert}(e_0,w) \wedge \forall w'_s \in \textsc{info-state}(e_0)\exists x_e[\textsc{person}(x,w') \wedge \textsc{invited}(l,x,w')]$

This conflict, however, can be resolved by an intervening non-veridical operator. When intervened by a modal operator like *must*, modeled in (8) as a quantifier over worlds refined by a modal base $f(e)$ and ordering source $g(e)$, the prejacent is evaluated in possible worlds, justifying epistemic uncertainty. When *shei* 'who' is interpreted under *must* in (9), the propositional argument of $\textsc{assert}(e_0)$ will be differentiated enough from the presupposition to avoid inferential conflict, due to the refinement of worlds quantified over in the assertion.

(8) $[\![\text{must}]\!] = \lambda f_{\langle v,p\rangle}\lambda g_{\langle v,p\rangle}\lambda e_v \lambda p_p.\forall w_s \in \textsc{Best}(f(e),g(e))[p(e,w) = 1]$

(9) $[\![\text{Liping must have invited shei.}]\!] = [\![\textsc{assert}(e_0)]\!]([\![\text{must}]\!]([\![\text{shei}]\!]([\![\text{Liping invited } x.]\!]))) =$

a. $\lambda w_s : \neg\forall w'_s \in \textsc{info-state}(e_0)\exists x_e[\textsc{person}(x,w') \wedge \textsc{invited}(l,x,w')].\text{Assert}(e_0,w) \wedge$
$\forall w'_s \in \textsc{info-state}(e_0)\forall w'_s \in \textsc{Best}(f(e_0),g(e_0))\exists x_e[\textsc{prsn}(x,w') \wedge \textsc{invite}(l,x,w')]$

Compatibility differences of modal types are captured by the height differences in modals, and a particular requirement of the event argument for $\textsc{info-state}(e)$ to be bound with high scoping attitude and speech operators like $\textsc{assert}(e_0)$ (Hacquard, 2010)above tense. As in (10), epistemics scope higher than tense, whereas deontics scope lower. Because the epistemic nature of $\textsc{info-state}(e)$ needs to be relevant to time, its event variable must scope higher.

(10) $[_{\text{S}}\lambda e_0 \textsc{assert}(e_0)[_{\text{ModP}}\textsc{Mod}(e_0)[_{\text{TP}}\text{T}[_{\text{AspP}}\textsc{Asp}_1[_{\text{ModP}}\textsc{Mod}(e_1)[_{\text{VP}}\text{V}(e_1)]]]]]]$

If variables are bound instead by lower scoping markers like deontic or dynamic modals, $\textsc{info-state}(e)$ is not defined, such that a *wh*-indefinite's presupposition becomes uninterpretable when it occurs low enough to take scope under a deontic modal. Therefore, the *wh*-indefinite's presupposition is required to be interpreted with a higher scope than tense operators, beyond the scope of deontic modals.

Conclusion: This proposal altogether provides a closer prediction of the distribution of *wh*-indefinites by relying on non-veridicality as a licensing source and shows that Hacquard's (2010) event-relative semantics can be extended to account for distributional differences between modal environments for *wh*-indefinites. Supporting Lin (1998), this new modality-based model captures the epistemic uncertainty of *wh*-indefinites by presupposing the non-commitment to the proposition formed with the *wh*-indefinites, and nicely rules out deontic/circumstantial modals by the definition of $\textsc{info-state}(e)$. Because $\textsc{info-state}(e)$ is only defined when the event variable scope over tense, deontics and dynamics are ruled out naturally. Theoretically, this study provides a viable model for non-veridical distributions, suggesting a priori that there might be an opposite type where deontics and dynamics are licensed, excluding epistemics.