(A-)symmetric Epistemic Intervention in Quantification and Wh-construals

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1 Introduction

• Epistemic Containment Principle (von Fintel and Iatridou 2003) refers to the descriptive generalization that a quantifier cannot have scope over an epistemic modal.

(1) Epistemic Containment Principle (ECP)
A quantifier cannot have scope over an epistemic modal
⇒ *[Quantifier ∼ Epistemic Modal [⋯xₖ⋯]]

(2) Necessity Epistemic Modal:
Most of our students must be home by now.
a. *Most of our students ∼ must / (most ∼ □).
b. Must ∼ most of our students / (□ ∼ most).

(3) Possibility Epistemic Modal:
Every student may have left.
a. *Every student ∼ may / (∀ ∼ ◎)
b. May ∼ every student / (◎ ∼ ∀)

• In this article the interaction between epistemic modals and four types of scope bearing element (SBE) is taken into consideration and examination, including (i) quantificational phrase with dou (QP...dou construction)¹ (ii) focus operators (zhìyòu ‘only’), (iii) negation (bu ‘not’), and (iv) wh-construals.

• Goals of this paper:
  – Show an asymmetry between epistemic modal auxiliaries (EM_{AUX} = keneng ‘may’) and epistemic modal adverbials (EM_{ADV} = yèxù ‘perhaps’) with respect to ECP.

¹In this article I follow Lin’s (1996) insightful study to assume that the quantificational force in QP...dou construction resided in dou(P), rather than in QP like mei-CL ‘every’, which acts more like a plural noun, in Chinese. See also Yang (2002) for an alternative analysis, which assumes mei to be a variable bound by dou.
(4) **Asymmetric ECP Effect:**

A scope bearing element (SBE), including QP-`dou`, negation, and focus operator, can scope over an EM\(_{AUX}\), but not an EM\(_{ADV}\).

a.\* [QP\(_i\)/SBE \textgtr EM\(_{ADV}\) [... \(x\_i\) ...]]:

\* Mei-`ge` xuesheng dou yexu EM\(_{ADV}\) likai-le.
Every-CL student all perhaps leave-SFP

‘For every student \(x\), it is perhaps that \(x\) has left/ \(\forall \gg \Diamond\).’

b. [QP\(_i\)/SBE \textgtr EM\(_{AUX}\) [... \(x\_i\) ...]]:

Mei-`ge` xuesheng dou keneng EM\(_{AUX}\) likai-le.
Every-CL student all may leave-SFP

‘For every student \(x\), it may be the case that \(x\) has left/ \(\forall \gg \Diamond\).’

– Show more than one phenomenon is behind ECP with respect to the \textit{wh}-construals.

(5) **Asymmetric Epistemic Intervention/ECP Effect:**

A Q-operator cannot bind a variable across an EM\(_{ADV}\), but can across an EM\(_{AUX}\); a reason \textit{wh}-operator (reason \textit{how} and \textit{why}) cannot scope over an EM\(_{ADV}\), but can scope over an EM\(_{AUX}\).

a.\* [Q\(_i\)-op \textgtr EM\(_{ADV}\) [... \textit{wh}(\(x\_i\)) ...]]

John yexu mai-guo sheme.
John perhaps buy-Prt what

‘*What might John have bought? (Interrogative)’
‘John perhaps had bought something. (Existential/Indefinite).’

b. [Q\(_i\)-op \textgtr EM\(_{AUX}\) [... \textit{wh}(\(x\_i\)) ...]]

John keneng mai-guo sheme?
John possible buy-Prt what

‘What might John have bought? (Interrogative)’
‘It may be the case that John had bought something (Existential/Indefinite).’

c.\* [Q_{REASON} \textgtr EM\(_{ADV}\) [...]]

* Weisheme John yexu likai-le?
why John perhaps leave

‘Why is it possible that John left?’

d. [Q_{REASON} \textgtr EM\(_{AUX}\) [...]]

Weisheme John keneng likai-le?
why John may leave

‘Why may John have left?’

2
(6) SYMMETRIC EPISTEMIC INTERVENTION EFFECT:

Covert movement of a wh-adverbial (manner how) across either $EM_{AUX}$ or $EM_{ADV}$ is generally prohibited.

a. $^* [Q_i - \text{op} \succ EM_{ADV} [\ldots t_i \ldots]]$

$^* John \ keneng \ zenme_{MANNER} \ chuli \ zhe-jian \ shi?$

John may how$_{MANNER}$ handle this-CL matter

‘In what manner may John handle this matter?’

b. $^* [Q_i - \text{op} \succ EM_{AUX} [\ldots t_i \ldots]]$

$^* John \ yexu \ zenme_{MANNER} \ chuli \ zhe-jian \ shi?$

John perhaps how$_{MANNER}$ handle this-CL matter

‘In what manner may John handle this matter?’

(7) SYMMETRIC ANTI-ECP EFFECT:

Wh-construals are prohibited when an epistemic modal occupies the sentence initial position, which is a contrary effect to the claim of the ECP.

a. ANTI-ECP EFFECT (UNSELECTIVE BINDING):

$^* [CP \ \text{Epistemic modal} \succ Q_i - \text{op} \ [TP \ldots wh(x_i) \ldots]]$

$Yexu/\ keneng \ John \ mai-guo \ sheme.$
perhaps/may John buy-Prt what

‘What may John have bought? (‘Interrogative’)

‘John may have bought something. (Existential/Indefinite).’

b. ANTI-ECP EFFECT (COVERT MOVEMENT):

$^* [CP \ \text{Epistemic modal} \succ Q_i - \text{op} \ [TP \ldots t_i \ldots]]$

$^* \ Yexu/^* \ keneng \ John \ zenme_{MANNER} \ chuli \ zhe-jian \ shi?$
perhaps/may John how$_{MANNER}$ handle this-CL matter

‘In what manner may John handle this matter?’

c. ANTI-ECP EFFECT (REASON wh-OPERATOR):

$^* [CP \ \text{Epistemic modal} \succ Q_{REASON} \ [TP \ldots]]$

$^* \ Yexu/^* \ keneng \ \text{weishen}e_{REASON} \ John \ likai-le?$
perhaps/may why John leave

‘Why is it possible that John left?’

– Propose an intervention account:

† Generalized Relativized Minimality theory in Rizzi (2004) is adopted, but it is proposed here that [Epistemic] feature should be also classified within the Quantificational class, according to its quantificational nature.
(8) Feature types:
   a. Argumental: person, number, gender, case...
   b. Quantificational: Wh, Neg, measure, focus...[Epistemic]
   c. Modifier: evaluative, epistemic, Neg, frequentative, celerative, measure, manner...
   d. Topic

† According to Lyons (1977)\(^2\),

→ a subjective modal is infused into the illocutionary force of the utterance, while

→ an objective modal is infused into the truth-conditional content.

→ Accordingly, two different syntax-semantics structural requirements are proposed: subjective $EM_{ADV}$ modifies the utterance and requires the whole CP as its complement, while an $EM_{AUX}$, under its objective reading, requires only a truth-conditional maximal projection (= TP) (cf. Huitink 2008).

(9) Syntax-semantics Structural Requirement:
   a. $\llbracket EM_{ADV} \ [CP] \rrbracket = \text{subjective conjecture}$
   b. $\llbracket EM_{AUX} \left\{ \begin{array}{c} \llbracket CP \rrbracket \\ \llbracket TP \rrbracket \end{array} \right\} = \left\{ \begin{array}{c} \text{subjective conjecture} \\ \text{objective conjecture} \end{array} \right\}$

† As a consequence,

→ the [Epistemic] feature of an $EM_{ADV}$ must undergo feature movement to check/value $[u_{Force}]$ in ForceP as $[i_{Epistemic}]$ in order to modify the whole CP and to express the conjecture of the speaker. On the contrary,

→ an $EM_{AUX}$ can be interpreted objectively in-situ because its structural requirement can be satisfied by external merger with TP, and ForceP can be valued as $[i_{Declarative}]$.

\footnote{See also Papafragou (2006), Tancredi (2007), Huitink (2008), Anand and Hacquard (2009), von Fintel and Gillies (2011), and among others for the subjectivity-objectivity distinction.}
(10) Feature Movement of \([\text{Epistemic}]\) Feature to ForceP:

\[
\text{ForceP} \quad [uForce] \quad \text{TopP} \\
\text{DP} \quad [\text{Top}] \quad \text{Top}' \\
\text{Subj} \quad \text{Top} \quad \text{ModalP} \\
\text{EM}_{ADV} \quad \text{ye}xu \quad [\text{Epistemic}] \\
\text{Modal} \quad \text{TP} \quad \text{EM}_{AUX} \quad [\text{Epistemic}] \\
\]

† Finally, based on the insight of Clausal-Typing Hypothesis (Cheng 1991), I assume that a \(wh\)-question would require the ForceP to be valued as \([i\text{Interrogative}]\) to express questioning (c.f. Pesetsky and Torrego 2004).

(11) Interrogative sentence:

\[
[\text{ForceP} \ [i\text{Interrogative}] \ [\text{IntP} \ Q_{\text{op}} \ [\text{TP} \ \text{John mai-guo sheme},?]]] \\
\Rightarrow \text{Questioning:} \\
\lambda x. \ \text{John bought } x \ \& \ \text{tell me the information about } x.
\]

† Consequently, the \textit{Quantificational} \([\text{Epistemic}]\) feature would induce three different syntactic effect with respect to the SBEs.

→ First of all, \([\text{Epistemic}]\) feature movement would be blocked by an SBE with \textit{Quantificational} feature, which is the asymmetric ECP effect.

(12) Asymmetric ECP Effect:

\[
\neg [\text{ForceP} \ [u\text{Force}] \ [Q \text{P}_{i}/SBE] \ [\text{ModP} \ \text{EM}_{ADV} \ [\text{TP} \ \ldots]]] \\
\]

→ Secondly, \([\text{Epistemic}]\) feature would contradictorily compete ForceP with \([\text{Interrogative}]\) for checking/valuation, which results in the blocking of interrogative reading in \(wh\)-construals.
(13) Asymmetric Epistemic Intervention Effect:

\[ *[\text{Force}P \ [u\text{Force}] \ [Q \ - \ op \ [\text{Modal}P \ EM_{ADV} \ [TP \ ...]]]] \]

→ Finally, a Quantificational [Epistemic] feature in both EM_{ADV} and EM_{AUX} becomes a strong intervener which would block another Quantificational feature movement, such as [Wh] feature, of a wh-adverbial.

(14) Symmetric Epistemic Intervention Effect:

\[ *[CP \ [ModalP \ EM_{ADV/AUX} \ [TP \ ... \ wh \ - \ adverbial \ ]] \]

2 Literature Review

2.1 Drubig (2001)

• Assume the framework in Westmoreland (1998):

i. Epistemic must (in contrast to root modals) is not a modal but must be analyzed as an evidential marker labelling the proposition in its scope as a deduction. It relates a proposition \( \varphi \) to some other information that serves as evidence for \( \varphi \).

ii. The traditional view that may \( \varphi \) or might \( \varphi \) is true (or acceptable) just as long as \( \varphi \) is consistent with the context does not suffice to capture its meaning; rather: an expression such as might \( \varphi \) is used to mean that the context contains causal factors that make \( \varphi \) plausible.

- In general we may say: just as a question marker takes a proposition and derives a question, an epistemic modal takes a proposition and yields an evidentially labelled proposition.

- An epistemic modal, such as must or may, according to this view, is part of the metalogical vocabulary, i.e. not equivalent to the square \( \square \) but more like the sign marking the deduction of an inference.

- Beyond that, the extrapropositional status of an epistemic modal implies that it takes scope over all propositional operators.

\( (\text{Drubig 2001, p.2 - p.5}) \)

\[ \implies \text{Epistemic modal} > \{ \text{negation / tense / aspect} \} \]

\[ \{ \text{question / focus operator} \} \]
2.2 von Fintel and Iatridou (2003)

- A specific descriptive condition on QUANTIFIER RAISING (QR):

(15) Epistemic Containment Principle (Refined Version):
At LF, a quantifier cannot bind its trace across an epistemic modal.
⇒ *[Quantifier, > Epistemic Modal [...ti...]].

2.3 Tancredi (2007)

- Two types of epistemic modal: \{ subjective \, \, objective \}
⇒ only subjective epistemic modal induced the ECP effect.

(16) Subjective ECP Effect in English:

a. #(As far as I know) Every student is perhaps Jones.
b. #(As far as I know) Most students are perhaps Jones

(17) Subjective ECP Effect in Japanese:

a.# Subete-no gakusei-ga moshikashitara Jones de aru
Every-GEN student-NOM perhaps Jones COP
‘Every student is perhaps Jones.’

b.# Hotondo-no gakusei-ga moshikashitara Jones de aru
Most-GEN student-NOM perhaps Jones COP
‘Most students are perhaps Jones.’

⇒ objective epistemic modal could cancel the ECP effect.

(18) Objective ECP canceling Effect in English:

a. (Objectively speaking,) Every student may be Jones.
b. (Objectively speaking,) Most students may be Jones.

(19) Objective ECP canceling Effect in Japanese:

a. (Kyakkanteki-ni mite) Subete-no gakusei-ga Jones de aru
Objectively looking Every-GEN student-NOM Jones COP
kamoshirenai
may
‘(Objectively speaking,) every student may be Jones’
b. *(Kyakanteki-ni mite) Hotondo-no gakusei-ga Jones de aru kamoshirenai*

Objectively looking Most-GEN student-NOM Jones COP

‘(Objectively speaking,) most students may be Jones’

- Analysis: **MULTI-MODEL MODAL THEORY OF I-SEMANTICS**

### 2.4 Huitink (2008)

- Similar pattern in Dutch: where epistemic modal auxiliaries can go, but epistemic modal adverbials cannot

(20) **Scope Over Epistemic Modal Auxiliaries in Dutch:**

\[
\text{Iedere student kan vertrokken zijn.} \quad \text{every student may have left be}
\]

‘Every student may have left. \((\forall \succ \lozenge / \lozenge \succ \forall)\)’

(21) **ECP Effect in Dutch (Epistemic Modal Adverbials):**

\[
\text{Iedereen heeft het misschien gedaan.} \quad \text{everyone has it perhaps done}
\]

‘Perhaps everyone has done it. \((\forall \succ \Diamond / \Diamond \succ \forall)\)’

- Subjective modality indicates the strength of the speech act, while objective modality contributes to content.
  - Default speech act for declaratives: assertion.
  - Subjective modals change the speech act.

- Quantifiers contribute to the propositional level of meaning
  \(\Rightarrow\) they scope under subjective epistemic modals.

<table>
<thead>
<tr>
<th>FORCE</th>
<th>CONTENT</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSERT</td>
<td>rain</td>
<td>It is raining</td>
</tr>
<tr>
<td>CONJECTURE</td>
<td>rain</td>
<td>It may(_S) be raining.</td>
</tr>
<tr>
<td>ASSERT</td>
<td>rain</td>
<td>It may(_O) be raining</td>
</tr>
</tbody>
</table>

### 2.5 Gagnon and Wellwood (2010)

- To follow Beghelli (1997) and Beghelli and Stowell (1997) to propose an topological account based on the quantificational left-periphery theory:
(22) \([_{CP} \text{Each} \succ \text{Epistemic Modal} \succ \text{Every} \succ [_{TP} \ldots]]\)

(23) Each Cancels the ECP Effect; Every doesn’t:
   a. Every girl might be in love with John, but some of them aren’t.
   b. Each girl might be in love with John, but some of them aren’t

3 Case Study in Chinese

3.1 QP...Dou Construction

- A counterexample to the ECP can be immediately detected with a direct translation of the English examples into Chinese.

(24) Counterexample to the ECP Effect:
   a. Mei-ge xuesheng dou keneng likai-le.
      Every-CL student all may leave-SFP
      ‘For every student \(x\), it may be the case that \(x\) has left/ \(\forall \succ \Diamond\).’
   b. Mei-ge xuesheng keneng dou likai-le.
      Every-CL student may all leave-SFP
      ‘It may be the case that every student have left/ \(\Diamond \succ \forall\).’

- However, it cannot be determined \textit{a priori} that ECP is inert in Chinese since the ECP effect is still observed once modal expressions such as \textit{yexu} ‘perhaps’ or \textit{dagai} ‘probably’ are present.

(25) ECP effect in Chinese:
   a.* Mei-ge xuesheng dou yexu likai-le.
      Every-CL student all perhaps leave-SFP
      ‘For every student \(x\), it is perhaps that \(x\) has left/ \(\forall \succ \Diamond\).’
   b. Mei-ge xuesheng yexu dou likai-le.
      Every-CL student perhaps all leave-SFP
      ‘It is perhaps that every student have left/ \(\Diamond \succ \forall\).’

(26) ECP effect in Chinese:
   a.* Mei-ge xuesheng dou dagai likai-le.
      Every-CL student all probably leave-SFP
      ‘For every student \(x\), it is probably that \(x\) has left/ \(\forall \succ \Diamond\).’
   b. Mei-ge xuesheng dagai dou likai-le.
      Every-CL student probably all leave-SFP
      ‘It is probably that every student have left/ \(\Diamond \succ \forall\).’

- Generalization: asymmetric ECP effect.
(27) Asymmetric ECP Effect:

A scope bearing element (SBE), including QP-dou, negation, and focus operator, can scope over an EM\textsubscript{AUX}, but not an EM\textsubscript{ADV}.

a. \([CP \ldots [\text{DouP} \text{QP}_i \text{dou} \succ EM\textsubscript{AUX} [\ldots x_i \ldots]]] \]

b. \([CP \ldots [\text{DouP} \text{QP}_i \text{dou} \succ EM\textsubscript{AUX} [\ldots x_i \ldots]]] \]

3.2 Focus Operators

- In Chinese the asymmetry between EM\textsubscript{AUX} and EM\textsubscript{ADV} would result in an asymmetric distribution also with respect to the focus operator. Specifically, as we have seen in the previous subsection, we would predict that a focus operator can take scope beyond an EM\textsubscript{AUX}, but can’t beyond an EM\textsubscript{ADV}.

(28) Focus operator zhiyou ‘only’ can scope beyond or behind an EM\textsubscript{AUX}:

   only may John buy-Prt this-CL book
   ‘The only possibility is that John bought this book.’

b. \textit{Zhiyou} John \textit{keneng} mai-guo zhe-ben shu.
   only John may buy-Prt this-CL book
   ‘Only John may have bought this book.’

c. \textit{Keneng zhiyou} John mai-guo zhe-ben shu.
   may only John buy-Prt this-CL book
   ‘It may be the case that only John bought this book.’

d. \textit{Keneng} John \textit{zhiyou} mai-guo zhe-ben shu.
   may John only buy-Prt this-CL book
   ‘It may be the case that John only bought this book.’

(29) Focus operator zhiyou ‘only’ cannot scope over an EM\textsubscript{ADV}:

a. \textit{* Zhiyou yexu} John mai-guo zhe-ben shu.
   only perhaps John buy-Prt this-CL book
   ‘Intended: The only possibility is that John bought this book.’

b. \textit{* Zhiyou} John \textit{yexu} mai-guo zhe-ben shu
   only John perhaps buy-Prt this-CL book
   ‘Only John, perhaps, had bought this book.’

c. \textit{Yexu zhiyou} John mai-guo zhe-ben shu.
   perhaps only John buy-Prt this-CL book
   ‘It is perhaps the case that only John bought this book.’

d. \textit{Yexu} John \textit{zhiyou} mai-guo zhe-ben shu.
   perhaps John only buy-Prt this-CL book
   ‘It is perhaps the case that John only bought this book.’
• Generalization: asymmetric ECP effect.

(30) Asymmetric ECP Effect:

A scope bearing element (SBE), including QP-*dou, negation, and focus operator, can scope over an EM_{AUX}, but not an EM_{ADV}.

a. \([CP \ldots [FocusP \quad zhiyou \quad \succ EM_{ADV} \quad [\ldots x_1 \ldots]]\]

b. \([CP \ldots [FocusP \quad zhiyou \quad \succ EM_{AUX} \quad [\ldots x_1 \ldots]]\]

3.3 Negation

• There are two types of negative expressions in Chinese: irrealis *bu ‘irrealis not’ and realis *mei(you) ‘realis not’. As noted in Tsai (2009), irrealis *bu can be located either beyond or below an epistemic modal, for example:

(31) a. John *keneng bu qu Taipei.
   John may not go Taipei
   ‘John may not go to Taipei.’

b. John *bu keneng qu Taipei.
   John not may go Taipei
   ‘It is not possible that John goes to Taipei.’

• However, *bu cannot scope over and negate the epistemic modal adverbial, for instance:

(32) *bu \succ ◇

a. John *yexu bu qu Taipei.
   John perhaps not go Taipei
   ‘It is perhaps the case that John doesn’t go to Taipei.’

b. *John bu yexu qu Taipei.
   John not perhaps go Taipei
   ‘It is not the case that John perhaps goes to Taipei.’

(33) *bu \succ ◇

a. John *dagai bu qu Taipei.
   John probably not go Taipei
   ‘It is maybe the case that John doesn’t go to Taipei.’

b. *John bu dagai qu Taipei.
   John not probably go Taipei
   ‘It is not the case that John maybe doesn’t go to Taipei.’
\[(34) \, ^*bu > ^*\]

a. John juedui bu qu Taipei.
   John definitely not go Taipei
   ‘It is definitely the case that John doesn’t go to Taipei.’

b. *John bu juedui qu Taipei.
   John not definitely go Taipei
   ‘It is not the case that John definitely go to Taipei.’

- Generalization: asymmetric ECP effect.

\[(35)\text{ Asymmetric ECP Effect:}\]
A scope bearing element (SBE), including QP-dou, negation, and focus operator, can scope over an EM\textsubscript{AUX}, but not an EM\textsubscript{ADV}.

a. *\([CP \ldots [NegP \, bu > EM\textsubscript{ADV} [\ldots x_i \ldots]]]\]

b. \([CP \ldots [NegP \, bu > EM\textsubscript{AUX} [\ldots x_i \ldots]]]\]

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
& QP-dou construction & Focus operator & Negation \\
\hline
EM\textsubscript{ADV} & ^*QP-dou > EM\textsubscript{ADV} & ^*Focus > EM\textsubscript{ADV} & ^*Negation > EM\textsubscript{ADV} \\
EM\textsubscript{AUX} & QP-dou > EM\textsubscript{AUX} & Focus > EM\textsubscript{AUX} & Negation > EM\textsubscript{AUX} \\
\hline
\end{tabular}
\end{table}

- Interim summary:

\[(36)\text{ Asymmetric ECP Effect:}\]
A scope bearing element (SBE), including QP-dou, negation, and focus operator, can scope over an EM\textsubscript{AUX}, but not an EM\textsubscript{ADV}.

a. *\([QP_i/SBE > EM\textsubscript{ADV} [\ldots x_i \ldots]].\]

b. \([QP_i/SBE > EM\textsubscript{AUX} [\ldots x_i \ldots]].\]

4 Analysis

- Puzzle: why SBEs cannot scope over an EM\textsubscript{ADV}, but can scope over an EM\textsubscript{AUX}?

- Speculation: SBEs block the covert [Epistemic] feature movement.
4.1 Generalized Relativized Minimality


(37) Feature Types:
   a. Argumental: person, number, gender, case...
   b. Quantificational: Wh, Neg, measure, focus...[Epistemic]
   c. Modifier: evaluative, epistemic, Neg, frequentative, celerative, measure, manner...
   d. Topic

- Two supportive views for this classification:
  (i) Traditional Kratzerian modal semantics and
  (ii) The ability of wh-indefinite licensing.

4.2 Covert Movement and Intervention Effect

- It has been argued in Pesetsky (2000) that there are two types of covert movement: feature movement and phrasal movement. Furthermore, he also proposed that intervention effect is induced by feature movement, but not by phrasal movement, for instance:

(38) Wh₁-In-Situ Undergoes Feature Movement (Intervention Effect):
   *Which book, didn’t which student read t₁?

(39) Wh₂-In-Situ Undergoes Phrasal Movement (No Intervention Effect):
   Which student didn’t read which book?

- Yang (2008) extended Pesetsky’s speculation and develop a comprehensive studies in Chinese (see also Yang 2011). Specifically, Yang proposed that wh-adverbials would undergo feature movement to obtain their scope position, and thus induce the intervention effect.

(40) Wh-adverbial Intervention Effect:

   a. * Mei-ge ren dou weisheme cizhi?
      every-CL person all why quit
      ‘Why does everyone quit?’

   b. * Mei-ge ren dou zemme cizhi?
      every-CL person all how quit
      ‘How does everyone quit?’

- I think that Yang has provided several convincing arguments and natural explanations to the intervention effect, based on the generalized relativized minimality approach. Thus, I follow these promising works to assume that feature movement would induce intervention effects, once a intervener with the same feature type were present in the syntactic structure.
4.3 The Syntax of ForceP Valuation

- Question: where and why did [Epistemic] feature move to?
  - [Epistemic] feature moves to check/value the [uForce] feature in ForceP to express speaker’s subjective conjecture.

(41) [Epistemic] Feature Movement:

- What’s the distinction between EM\textsubscript{ADV} and EM\textsubscript{AUX}?
  - An EM\textsubscript{ADV} would always undergo feature movement to check/value ForceP, but an EM\textsubscript{AUX} could optionally do so.

  - This distinction is attributed to the syntactic structure of ModalP. More specifically, following standard assumption of the Kratzerian modal semantics, an epistemic modal would take a proposition as (one of) its argument (Kratzer 1977, 1981, and 1991). Putting this assumption in the minimalist terms, I propose that an epistemic modal feature [epistemic], being \textit{Quantificational}, would require a propositional maximal projection as its sister node.

  - The structural requirement of an EM\textsubscript{AUX} can be satisfied with external merger (Chomsky 2006). That is, through syntactic derivation, an EM\textsubscript{AUX}, with a [Epistemic] feature, always merged with an propositional maximal projection inherently, and the structural requirement can be subsequently satisfied. On the contrary, an EM\textsubscript{ADV}, being hosted inherently in the specifier of ModalP, cannot satisfied the structural requirement. Thus, [epistemic] feature of EM\textsubscript{ADV} would undergo feature movement to ForceP since ForceP always dominates a propositional maximal projection, the CP phase.

- Some semantic consequence:
  - As noted in Lyon (1977), an objective epistemic modal contributes to the truth conditional content of the utterance, but a subjective epistemic modal contributes to the illocutionary force of the utterance.
In addition, Tancredi (2007) and Huitink (2008) also argued quite convincingly for a distinction between subjective epistemic modal and objective epistemic modal, and proposed that an EM_{ADV} is commonly subjective.

These arguments probably can be correlated nicely to the assumption that EM_{ADV} always undergo feature movement to ForceP for the structural requirements. That is, a sentence would express subjectivity once its ForceP were valued as $[i\text{Epistemic}]$. On the contrary, an EM_{AUX} optionally values the ForceP and the sentence could be interpreted as $\text{Force}([i\text{Declarative}]) + \text{EM}_{AUX}([\text{Epistemic}])$, which denotes objectivity.

4.4 The Feature Movement Account

- Given our assumptions, the asymmetrical ECP effect is induced because of the obligatory feature movement of [Epistemic] feature and its structural requirement. Specifically, EM_{ADV} must undergo feature movement to ForceP because it sister node, an intermediate Modal$'$ is not a propositional maximal projection. On the contrary, EM_{AUX} can stay in-situ since its structural requirement has been satisfied with external merger.

\begin{equation}
\text{(42) } \text{EM}_{ADV} \text{ Induced ECP effect:}
\end{equation}
(43) EM_{AUX} Obviated ECP effect (Under Objective Reading):

```
ForceP
  \[i\text{Declarative}\]
      DouP
        QP
          mei-ge xuesheng
        Dou
          [Quant.]
      ModalP
        Modal
          keneng
            TP
              \[\text{Epistemic}\]
```

5 Wh-construals

- Epistemic modal would also interact with \textit{wh}-construals. Specifically, three types of \textit{wh}-construals are investigated, including unselective binding, covert \textit{wh}-movement, and the reason-\textit{wh}-phrase in CP. We will see various epistemic intervention effects and propose how to capture these within our framework.

5.1 Unselective Binding

- As indicated in the translations, \textit{yexu} would be compatible with a \textit{wh}-argument only if this \textit{wh}-phrase were used as an indefinite \textit{wh}-expression. By contrast, \textit{keneng} is not so restricted and compatible with both interrogative reading and existential reading.

(44) EM_{ADV} within Unselective Binding:

\textit{John yexu mai-guo sheme.}
John perhaps buy-Prt what
‘What might John have bought? (‘Interrogative)’
‘John perhaps had bought something. (Existential/Indefinite).’

(45) EM_{AUX} within Unselective Binding:

\textit{John keneng mai-guo sheme?}
John may buy-Prt what
‘What might John have bought? (Interrogative)’
‘It is possible that John bought something (Existential/Indefinite).’

- The similar point can be made clear by a further supportive evidence from instrumental-\textit{zenme}(-\textit{yang}) ‘by what means’, which is also sensitive to unselective binding (Tsai 1999, 2000, 2008):
(46) **EM$_{ADV}$ with *zenme*(yang):**

\[\text{‘By what means may John go to school?’}\]

(47) **EM$_{AUX}$ with *zenme*(yang):**

\[\text{‘By what means may John go to school?’}\]

- Besides, the phenomena can become even more complicated when the relative position between the subject and epistemic modal are inverse.

- When an epistemic modal precedes a subject and stays at a sentence initial position, the interrogative reading is blocked with respect to both EM$_{AUX}$ and EM$_{ADV}$.

(48) **Sentence-Initial EM$_{AUX}$ Blocks Interrogative Reading:**

\[\text{‘John may have bought something. (Existential/Indefinite).’}\]

(49) **Sentence-Initial EM$_{ADV}$ Blocks Interrogative Reading:**

\[\text{‘John perhaps bought something. (Existential/Indefinite).’}\]

- An interim summary here is that an epistemic modal seems to display different effect with respect to its syntactic position.

  - On the one hand, within a sentence, it asymmetrically interferes the unselective binding construals: only EM$_{ADV}$ blocks the interrogative reading.

(50) **Asymmetric Epistemic Intervention Effect:**

\[\text{A Q-operator cannot bind a variable across an EM$_{ADV}$, but can across an EM$_{AUX}$; a reason wh-operator (reason how and why) cannot scope over an EM$_{ADV}$, but can scope over an EM$_{AUX}$.}\]

a. \[Q_i \text{-op} \triangleright EM_{ADV} [\ldots \text{wh}(x_i) \ldots ]\]

b. \[Q_i \text{-op} \triangleright EM_{AUX} [\ldots \text{wh}(x_i) \ldots ]\]

- On the other hand, at the sentence initial position, both EM$_{ADV}$ and EM$_{AUX}$ symmetrically blocked the interrogative reading.
Symmetric Anti-ECP Effect (Unselective Binding):

a. $[\text{EM}_{\text{ADV}} \succ Q_i \text{-op} \ldots [\text{Subject} \ldots \ldots \ldots wh(x_i) \ldots]]$

b. $[\text{EM}_{\text{AUX}} \succ Q_i \text{-op} \ldots [\text{Subject} \ldots \ldots \ldots wh(x_i) \ldots]]$

5.2 Covert Wh-Movement

- let us consider the case of manner-zenme ‘in what manner’ and its interaction with epistemic modal.

(52) $\text{EM}_{\text{AUX}}$ Blocks the Wh-Construal:

*John keneng zenmeMANNER chuli zhe-jian shi?
John may howMANNER handle this-CL matter ‘In what manner may John handle this matter?’

(53) $\text{EM}_{\text{ADV}}$ Blocks the Wh-Construal:

*John yexu zenmeMANNER chuli zhe-jian shi?
John perhaps howMANNER handle this-CL matter ‘In what manner may John handle this matter?’

- Surprisingly, the asymmetric property is absent. That is, as noted in Tsai (2008), post-modal zenme can only be interpreted as instrumental-how, but not as manner-how.

- On the other hand, $\text{EM}_{\text{ADV}}$ and $\text{EM}_{\text{AUX}}$ both induced the identical effect; namely, they rule out the sentence with manner-zenme.

(54) Sentence-Initial $\text{EM}_{\text{AUX}}$ Blocks the Wh-Construal:

*Keneng John zenmeMANNER chuli zhe-jian shi?
may John howMANNER handle this-CL matter ‘In what manner may John handle this matter?’

(55) Sentence-Initial $\text{EM}_{\text{ADV}}$ Blocks the Wh-Construal:

*Yexu John zenmeMANNER chuli zhe-jian shi?
perhaps John howMANNER handle this-CL matter ‘In what manner may John handle this matter?’

- Generalization: epistemic modal is generally incompatible with covert wh-movement:

(56) Symmetric Epistemic Intervention (Covert Wh-Movement):

Covert movement of a wh-adverbial (manner how) across either $\text{EM}_{\text{AUX}}$ or $\text{EM}_{\text{ADV}}$ is generally prohibited.
(57) Symmetric Anti-ECP Effect (Covert Wh-Movement):

a. \([Q_{-op} \succ EM_{ADV} \ldots t_i \ldots]\]

b. \([Q_{-op} \succ EM_{AUX} \ldots t_i \ldots]\]

5.3 **How-Why in CP**

- Finally, in addition to the unselective binding construal and the movement construal, the structure involving *weisheme* ‘why’ and *reason-zenme* ‘reason how’ should be taken into consideration, since both of them can be externally merged highly in the CP domain (Stepanov and Tsai 2008).

(58) Weisheme ‘why’:

a. *Weisheme John *keneng* likai-le?
   john why may leave
   ‘Why is it possible that John left?’

b. *Weisheme John *yexu* likai-le?
   john perhaps leave
   ‘Why is it possible that John left?’

(59) Zenme ‘reason how’

a. John *zenme\textsubscript{REASON} keneng* zhu wancan.
   john how may cook dinner
   ‘How come that John cooked for dinner.’

b. *John *zenme\textsubscript{REASON} yexu* zhu wancan
   john perhaps cook dinner
   ‘How can it be possible that John cook for dinner.’

- The inverse order between epistemic modal and the reason *wh*-operator patterns with both unselective binding and covert movement construal. Both EM\textsubscript{ADV} and EM\textsubscript{AUX} rule out the structure, displaying the anti-epistemic containment effect.

(60) ◇ ≻ Weisheme ‘Reason Why’:

a. *Keneng weisheme\textsubscript{REASON} John ikai-le?
   keneng why john leave
   ‘Why is it possible that John left?’

b. *Yexu weisheme\textsubscript{REASON} John ikai-le?
   perhaps why john leave
   ‘Why is it possible that John left?’
(61) \( \diamondsuit \prec Zemne \text{‘Reason How’} \\
\text{a.} \quad \textbf{Keneng} \ \text{Zemne}_\text{REASON} \ John \ zhu \ wancan. \\
\text{may how John cook dinner} \\
\text{‘How come that John cooked for dinner.’} \\
\text{b.} \quad \textbf{Yexu} \ \text{Zemne}_\text{REASON} \ John \ zhu \ wancan \\
\text{perhaps how John cook dinner} \\
\text{‘How can it be possible that John cook for dinner?’} \\

- Generalization: \textit{how-why} in CP shows the similar pattern with the unselective binding construal:

(62) Asymmetric ECP Effect (Reason \textit{Wh}-Operator):
\begin{align*}
\text{c.} & \ [Q_{\text{REASON}} \succ \text{EM}_{\text{ADV}} \ [TP \ldots]] \\
\text{d.} & \ [Q_{\text{REASON}} \succ \text{EM}_{\text{AUX}} \ [TP \ldots]]
\end{align*}

(63) Symmetric Anti-ECP Effect (Reason \textit{Wh}-Operator):
\begin{align*}
\text{a.} & \ [\text{EM}_{\text{ADV}} \succ Q_{\text{REASON}} \ [TP \ldots]] \\
\text{b.} & \ [\text{EM}_{\text{AUX}} \succ Q_{\text{REASON}} \ [TP \ldots]]
\end{align*}

5.4 The Comprehensive Picture

5.4.1 Interim Summary

- Table for different \textit{wh}-construal with different patterns:

(64) Table for \textit{Wh}-Construal Generalization:

<table>
<thead>
<tr>
<th>\text{Unselective Binding}</th>
<th>\text{Covert Movement}</th>
<th>\text{How-Why in CP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>([Q_{(i)}\text{-op} \succ \text{EM}_{\text{ADV}} \ [\ldots t_i/ x_i \ldots]])</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>([Q_{(i)}\text{-op} \succ \text{EM}_{\text{AUX}} \ [\ldots t_i/ x_i \ldots]])</td>
<td>*</td>
<td>ok</td>
</tr>
<tr>
<td>([\text{EM}<em>{\text{ADV}} \succ Q</em>{(i)}\text{-op} \ [\ldots t_i/ x_i \ldots]])</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>([\text{EM}<em>{\text{AUX}} \succ Q</em>{(i)}\text{-op} \ [\ldots t_i/ x_i \ldots]])</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

5.4.2 Feature Interpretability Contradiction in ForceP

- Explain the various (a-)symmetric epistemic intervention/containment effect within the [Epistemic] feature movement framework:

  - Feature interpretability contradiction in ForceP:
    both \textit{wh}-phrase and \text{EM}_{\text{ADV}} intend to type the whole clause as \([i\text{Interrogative}]\) and \([i\text{Epistemic}]\), respectively.
Feature Contradiction in ForceP:

(65) Feature Contradiction in ForceP:

- Quantificational [Epistemic] feature blocked [Wh] feature movement:

(66) Quantificational [Epistemic] Intervention Effect:
- Symmetric anti-epistemic containment effect: \( wh \)-construals are prohibited when an epistemic modal occupies the sentence initial position.

- Epistemic modal is externally merged in ForceP:
  \( \Rightarrow \) [uForce] feature is checked/valued as [iEpistemic]
  \( \Rightarrow \) No place for the [Interrogative] feature
  \( \Rightarrow \) The clause type is incompatible with a \( wh \)-phrase.

(67) Anti-ECP Effect (Unselective Binding):

(68) Anti-ECP Effect (Covert \( Wh \)-Movement):
6 Concluding Remarks

- To conclude, this article presents the investigation to the ECP effect (von Fintel and Iatridou 2003). From many different perspectives, I think Chinese can bring us the EM$_{ADV}$-EM$_{AUX}$ dichotomy, which could possibly be a clue for the comprehensive picture of the ECP effect.

- In addition to the quantifier-modal interaction, many quantificational construction including focus operator, negation, and wh-construals are discussed and examined in this paper, and some speculation is provided.

- Specifically, I propose that the ECP effect is a consequence of three independent working hypotheses: generalized relativized minimality, feature-induced intervention effect, and the syntax of ForceP valuation.

- This speculation, however, may be still far from the final destination since many aspects of this issue still call for explanations and further evidences.


