nandao-Qs: When Suprise Sparks Inquiry*

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1 Introduction

Nandao is a Mandarin adverb that has been traditionally analyzed as a rhetorical question marker that enhances rhetorical force (Alleton, 1988; Shuxiang & Shengshu, 2012; Xu, 2012), as exemplified in (1). However, other scholars argue that *nandao* questions (hereafter, *nandao*-Qs) convey uncertainty, suggestion, or bias (Gong, 1995; Xu, 2017), illustrated in (2). In contrast, Jing-Schmidt (2008) offers a different perspective, suggesting that *nandao*-Qs consistently signal incredulity, reflecting the speaker's emotional state and their confrontation in broader discourse.

(1) RHETORICAL QUESTION: A and B are talking about a colleague, Lee, who is going to work on Sunday. B does not think people usually go to work on Sunday.
A: Lee zhoumo ye dasuan qu shangban. ('Lee is planning to work on weekends too.')
B: nandao ta fafeng-le ma?
nandao he become.crazy-PERF Y/N-Q
Aprox. 'Is he crazy?'

(2) BIASED QUESTION: A sits in a windowless room working. A believes it is not rainy. At 10, B enters the room with a dripping raincoat. Then A asks B:
A: Nandao waimian xiayu-le ma?
nandao outside fall.rain-ASP Y/N-Q
'It is not the case that it is raining outside, right?'

I present a usage of *nandao-Qs* that has been largely neglected in the existing literature, as illustrated in (3) where the question is not clearly used as either a biased question or a rhetorical question.

(3) A sits in a windowless room working. A has no expectation over the weather. At 10, B enters the room with a dripping raincoat. Then A asks B:
A: Nandao waimian xiayu-le ma?
nandao outside fall.rain-ASP Y/N-Q
'Is it rainy outside?'

This class of usage prompted us to rethink the conventional meaning encoded by *nandao*. Do rhetoricity, and bias observed in the literature are encoded in the lexical entry or a consequence of pragmatic effects. This paper tries to argue that *nandao-Qs* conventionally encode a particular type of evidential signal, while the epistemic bias and rhetoricity are two artifacts. I propose a semantics for *nandao* based on Kernel in Von Fintel & Gillies (2010), which I see as a more unified account for its different uses.

Overview:

1. I show that the *nandao-Qs* exhibit a multifaceted empirical profile that involves:
   (a) A piece of evidence for the prejacent p is necessary.
   (b) The speaker does not have to believe either p or $\neg p$ to ask the question.
   (c) The evidence is not expected by the speaker.
   (d) The unexpectedness can only be settled by learning p.
2. Based on the data, I provide a semantics of *nandao* in terms of its felicity condition based on Von Fintel & Gillies (2010)'s Kernel as follows:
   Felicity condition of *nandao*: Fix a c-relevant kernel K:
   i p is a piece of direct information in c and ϕ is one proposition that follows from p
   ii $[\![\textit{nandao}\,\phi?]\!]^{c,w}$ is only defined iff $(\bigcap K) \cap U = \varnothing$ and the speaker c_s needs to learn $[\![\phi]\!]^c$ such that $[\![\phi?]\!]^c$ is not directly settled in K to resolve the unexpectedness.
3. Following the semantics given, I show that:
   (a) The selectional constraint of a necessary polar question is derivable as an optimal strategy.
   (b) The association with rhetoricity is due to the contexts where *nandao-Qs* are used also provide a good environment (à la Farkas 2023) for rhetorical questions.
4. I show that the investigation of *nandao* also sheds light on the connection between the literature on bias, evidentiality and epistemic modality, prompting more thinking on to what extent is one's knowledge considered as bias (e.g., Is your epistemic inference a bias?).

Before moving onto the new findings and analyses, I here provide some crucial facts about *nandao*, some of which are quite relevant in understanding the ramifications of the proposed semantics.

The distribution of *nandao* *Nandao* is an adverb that can only appear in polar questions, and it is incompatible with declaratives and WH-questions (Xu, 2012).

(4) The distribution of *nandao* (Xu, 2012, 510,512)

a. *Nandao Lisi hui lai (*ma)
   nandao Lisi will come Y/N-Q
   Int. 'Lisi will not come' [*DECL]

b. *Nandao Zhangdan weishenme qu xuexiao (ma)?
   nandao Zhangsan why go school Y/N-Q
   Int. 'Why does Zhangsan go to school?' [*WH-Q]

The etymology of *nandao*

- Sun (2007) argued that the adverb *nandao* originates from the combination of *nan* 'hard and *dao* 'say'.
- The literal translation of *nandao* is 'it is hard to say...', suggesting that the interlocuter using *nandao* finds it difficult to commit to the following proposition(?)/prejacent.
- According to Xu (2018), the (epistemic) evaluation of the prejacent is made by the speaker (5a), rather than based on the beliefs of the addressee or objective facts (5b-5c).

(5) Speaker-oriented evaluation (Adapted from Xu, 2018, 450)

A: Nandao Zhangsan bu xihuan shuiguo ma
nandao Zhangsan not like fruit y/n-q

'Zhangsan likes fruit, right?'

a. $\rightsquigarrow$ 'A believes that Zhangsan likes fruit.'

b. $\not\rightsquigarrow$ 'In fact, Zhangsan likes fruit.'

c. $\not\rightsquigarrow$ 'The addressee believes that Zhangsan believes fruit.'

2 Previous analyses of *nandao*

. . . . . WE WILL SKIP MOST OF THIS . . . . .

2.1 *NANDAO* AS A BIASED QUESTION WORD?

Questions that contain *nandao* can be perceived as either rhetorical questions (in the sense of Rohde 2006; Caponigro & Sprouse 2007) or information-seeking biased questions.

(6) AMBIGUOUS *nandao-Qs*[1] (Xu, 2017, 48)

Nandao zhe jiushi shichang jingji (ma)?
nandao this only.be market economy Y/N-Q

(Rhetorical) 'It is not the case that this is market economy.'
(Biased) 'It is not the case that this is market economy, right?'

- A strong assertion of $\neg p$ or as a question that prefers a particular answer (i.e., $\neg p$)
- The degree of the speaker's commitment to the opposite of the sentence radical$\rightsquigarrow$how much information-seeking.

2.1.1 Central Claim

Xu's central claim is that *nandao-Qs* **necessarily** convey a **negative** [2] **epistemic** bias (i.e., $\neg p$ when the sentence radical is p, and vice versa). This bias can be either strong (as in rhetorical questions) or weak (as in information-seeking biased questions).

Necessary bias

(7) A sits in a windowless room working. A doesn't know anything about the weather outside and does not have any expectation about the weather. At 10, B enters the room. Then A asks B: (Xu, 2018, 448)

a. Waimian xiayu-le ma?
outside fall.rain-ASP Y/N-Q
'Is it raining outside?'

b. # Nandao waimian xiayu-le ma?
nandao outside fall.rain-ASP Y/N-Q
'It is not the case it is raining outside, right?'

c. # Nandao waimian mei xiayu-le ma?
nandao outside not fall.rain-ASP Y/N-Q
'It is not the case that it is not raining outside, right?'

[1] The original translations provided by Xu were, 'This is not a market economy.' and 'This is not a market economy, right?' To avoid the complexity of distinguishing between high and low negation, the translation has been revised to 'It is not the case that. . . right?'. This applies similarly to the following examples as well.

Epistemic bias

(8) A sits in a windowless room working. A doesn't know anything about the weather outside and does not have any expectation about the weather. At 10, B enters the room with a dripping raincoat. Then A asks B: (Xu, 2017, 55)

a. Waimian xiayu-le ma?
outside fall.rain-ASP Y/N-Q
'Is it raining outside?'

b. # Nandao waimian xiayu-le ma?
nandao outside fall.rain-ASP Y/N-Q
'It is not the case that it is raining outside, right?'

c. # Nandao waimian mei xiayu-le ma?
nandao outside not fall.rain-ASP Y/N-Q
'It is not the case that it is not raining outside, right?'

(9) Policeman A strongly believes criminal B has not escaped. During a search, A finds a receipt of yesterday's flight in B's name. So, A asks his colleagues: (Xu, 2017, 54)

Nandao ta feizou-le ma?
nandao he fly.away-ASP Y/N-Q

'It is not the case that he has escaped, right?'
⇝ Epistemic > Evidential

Negative bias

(10) The speaker believes that there is no one in a house. (Xu, 2018, 449)

a. # Nandao wuli mei ren?
nandao room.in no person
'It is not the case there are not people in the room, right?'
Int. 'It is not the case there are people in the room, right?'

b. Nandao wuli you ren?
nandao room.in exist person
'It is not the case there are people in the room, right?'

2.1.2 Xu's treatment-*nandao* as an illocutionary modifier

By employing a battery of tests (see Table 1) to compare with presuppositions (P), Conventional Implicatures (CI), and Illocutionary Modifiers (IM), he established the status of *nandao* being an illocutionary modifier[3], expressing the bias as the not-at-issue content.

[3]For more details about the tests and results, I refer interested readers to the sections 3.3.3 and 3.3.4 in Xu (2017) and the references therein, where the Xu also compared *nandao* with high negation, VERUM and more.

	P	CI	IM (*alas*)	IM (evidential)	*nandao*
Convey new information	×	✓	✓	✓	✓
Scope over operators	✓	✓	✓	✓	✓
Participant-oriented	×	✓	✓	✓	✓
Hey, wait a minute test	✓	✓	✓	✓	✓
Backgrounding effect	✓	×	×	×	×
Antibackgrounding effect	×	✓	×	×	×
Question Formation Test	×	×	×	×	×

Table 1: Comparison among different kinds of not-at-issue content (Xu, 2017, 95)

. . . . . We ARE BACK HERE . . . . . .

Update semantics Following the update semantics from Farkas & Bruce (2010), he argued that by uttering *nandao-p?*, the speaker makes their biased belief public, specifically that they consider $\neg p$ to be more likely than p and this belief is added to the speaker's discourse commitment(DC) set[4] (a formal notation in 11).

(11) $[\![\textit{nandao-p?}]\!](\text{DC}_{s,i}) = \text{DC}_{s,o} = \text{DC}_{s,i} \cup \{\neg p \succ^{s}_{g(w)} p\}$[5] public bias (Xu, 2017, 93)

nandao picks out the unique highlighted proposition from the set of highlighted answers to Q, then updates the speaker's DC with the proposition that the complement proposition (i.e., $\neg p$ if we assume the surface syntax is p) is more likely than the unique highlighted proposition (i.e., p).

(12) [nandao]([ForceP])= K_o such that

(i) $DC_{s,o} = DC_{s,i} \cup \{(\lambda T : \exists_1 p \in \text{PQ}\ [p \in \bigcup\bigcap top(T) \wedge W \setminus p \in \bigcup\bigcup top(T)].$

$W \setminus \iota q \in \bigcup\bigcap top(T) \succ^{s}_{g(w)} \iota q \in \bigcup\bigcap top(T))(T_i)\}$ negative bias

(Xu, 2017, 102-103)

2.2 *NANDAO*-QS AS AN EMOTIONAL CONSTRUCTION

Jing-Schmidt (2008) offers a pragmatic perspective, suggesting that *nandao*-Qs reflect the speaker's emotional state. According to this view, *nandao*-Qs encode incredulity, arising from the confrontational nature of the discourse. The meaning of *nandao* depends on its relationship with the broader discourse context, including the speaker's emotional state, the interlocutor's expectations, and cultural norms.

[4] In Farkas & Bruce (2010) and other approaches they are based on, questions are usually considered unable to add anything to the DC but Xu pointed out that their dialogue model only discusses the at-issue content of questions while the effect of not-at-issue content (e.g., bias, presupposition) is not a precise violation of their original assumptions for questions.

[5] s is the speaker, g is the ordering source following the Krazterian Modality Semantics. That said, according to the epistemic state of the speaker, $\neg p$ is more likely than p.

The central claim is that *nandao* does not reinforce truth values but signals incredulity—expressing the speaker's disbelief or emotional resistance to an unexpected proposition. This approach shifts the focus from abstract logical structures to context-dependent interactions. For example, in a dialogue where a character is accused of making a mistake, the response "*nandao* I made a mistake?" does not assert innocence but shows the speaker's difficulty in accepting the accusation. This work highlights *nandao* as a pragmatic tool in social interactions, moving beyond truth-conditional semantics. It provides important insights that the current study will revisit and build upon.

- 💣This account captures some key aspects of the evidentiality of *nandao*, but focuses more on the emotions of the contexts where *nandao-Qs* are used.
- 💣This account does not offer promising connections between evidentiality, rhetorical questions, and bias.

3 (Semi-)New Data

3.1 Empirical Claim 1: *nandao-Qs* are evidence-driven

Different from what has been argued before in Xu (2017), I argue that *nandao*-Qs are evidence-driven, aligning with Jing-Schmidt (2008)'s claim that the use of *nandao* is contingent upon confrontation in the discourse. Consider the minimally differing contexts in (13), which vary only in the contextual evidence available, while the speaker has no prior epistemic bias[6]. In context 1, the speaker can felicitously use a *nandao* question, but not in context 2. This contrast highlights that one function of *nandao*-Qs is to encode evidentiality. Therefore, I argue that *nandao*-Qs conventionally encode a positive evidential bias (in the sense of Sudo, 2013). This is also corroborated by Xu's findings in Table 1, where he show *nandao* functions similarly with evidential markers.

(13) CONTEXT 1: A is sitting in a windowless room working. A doesn't know the weather or have any expectations. At 10, B enters the room with a dripping raincoat.
CONTEXT 2: A is sitting in a windowless room working. A doesn't know the weather or have any expectations. At 10, B enters the room.
CONTEXT 3: A doesn't know the weather or have any expectations. At 10, A notices that it is raining outside and B enters the room with a dripping raincoat. Then A asks B:
Nandao waimian xiayu-le ma?
nandao outside fall.rain-PERF Y/N-Q
Aprox.'Is it raining outside?' **☑Context 1 # Context 2 # Context 3**

Moreover, the evidence should be indirect (as in Willett 1988's source of information), as suggested by the infelicitous use in context 3, where the prejacent cannot be directly settled by the contextual evidence. The evidential signal that *nandao* carries is similar to what *must* conveys, as analyzed in Von Fintel & Gillies (2010). This parallel is expected, as Xu (2017) already argued that *nandao* functions as an epistemic modal adverb. Furthermore, like *must*, the prejacent of

[6]Note that the weather is unpredictable for the speaker in these examples.

nandao-Qs is reached through indirect inference rather than direct observation or a trustworthy report.

3.2 Empirical Claim 2: *nandao-Qs* do not encode epistemic bias

The second empirical claim is that *nandao*-Qs do not conventionally encode the speaker's epistemic bias. Consider two minimally differing contexts in (14), which vary only in the speaker's epistemic bias. The speaker can use the same *nandao* question both when they have no bias (context 1) and when they have a negative bias (context 2).

(14) CONTEXT 1: A is sitting in a windowless room working. A doesn't know the weather or have any expectations. At 10, B enters the room with a dripping raincoat. A asks B:
CONTEXT 2: A is sitting in a windowless room working. A believes it is not raining outside. At 10, B enters the room with a dripping raincoat. Then A asks B:

A: Nandao waimian xiayu-le ma?
nandao outside fall.rain-PERF Y/N-Q
Aprox. 'Is it raining outside?'

☑Context 1 ☑Context 2

Moreover, this question expresses that the speaker proposes the possibility of raining for discussion but does not make his own bias public to the addressee.

3.3 Empirical Claim 3: The evidence is unexpected

In addition to the evidence being indirect, *nandao* also imposes extra constraints on the contextual evidence. The third empirical claim is that a felicitous use of *nandao*-Qs requires the contextual evidence to be unexpected to the speaker. Consider the examples in (15): in context 1, the event of wearing raincoat is unexpected to the speaker, whereas in context 2, it is not. Hence, *nandao* requires evidence for the prejacent to be unexpected at the context.

(15) CONTEXT 1: [Actual World] A and B are living in an area where people do not wear raincoat unless under special occasions (e.g., raining, going to the waterpark and so on). A then believes wearing raincoat is a rare case. A is sitting in a windowless room working. A does not know the weather outside. At 10, B enters the room with a dripping raincoat. Then A asks B:
CONTEXT 2: [Hypothetical World 1] A and B live in an area that is equally rainy and sunny. A has no expectation over whether people would wear raincoat. (same as above)
CONTEXT 3: [Hypothetical World 2] A and B live in an area that is always rainy. A then believes that wearing raincoat is a normal case. (same as above)

A: Nandao waimian xiayu-le ma?
nandao outside fall.rain-PERF Y/N-Q
Aprox. 'Is it raining outside?' **☑Context 1 ☑Context 2 #Context 3**

Note that following Van Rooy & Safarova (2003), I define unexpectedness, which occurs when evidence carries high informational value. In addition, by default, an event or state p is

more informative than $\neg p$ (i.e., a grammatical prior). That said, an event (e.g., wearing a raincoat) is by default more surprising than its negated counterpart (i.e, not wearing a raincoat). The unexpectedness can come from disbelief (i.e., context 1 above) or default becoming salient (context 2 above)

(16) Assume p is the contextual evidence

a. $inf(p) > inf(\neg p)$ [Default]

b. $inf(p) > inf(\neg p) \downarrow$ [Disbelief]

On the default state The concept of a default information state is empirical, as Givón (1978) noted: positive assertions (e.g., "She is pregnant") are typically more marked and informative than negatives ("She is not pregnant"). Negative statements generally convey less information. However, this default (or grammatical prior) can be overridden by factors like social norms or acquired knowledge. For instance, "A person should drink water" is less informative than "A person should not drink water" because we assume people need water. Similarly, if someone knows it's raining, "It is rainy" becomes less informative than "It is not rainy." A default state reflects the speaker's implicit beliefs, and unexpectedness can arise from conflicts with either implicit assumptions or explicit beliefs. This provides insights into the beliefs-based bias versus more general expectation-based bias. Then to judge whether *nandao* involves epistemic bias, then it really depends on how we define bias at first.

3.4 Empirical Claim 4: Learning the prejacent settles the unexpectedness

The unexpectedness can only be resolved by confirming the prejacent[7], not by rejecting it. For instance, in the continuation of the above example (17), if A confirms to B that it is raining, B can conclude that B wearing a raincoat is due to the rain. With this information, the event of B wearing a raincoat is no longer unexpected or informative to B, eliminating the need for further inquiry. Conversely, if A confirms to B that it is not raining, B is unable to draw any conclusion from this information. Instead, the event of B wearing raincoat becomes even more unexpected. B is left confused and unable to reconcile the evidence, prompting them to ask a "why"-question to specifically inquire about the unexpected event. This behavior closely resembles that of the precondition particle described in Theiler (2017), which requires the speaker to necessarily learn one instantiation of the highlighted property of a question. In the case of polar questions, this entails learning the prejacent.

(17) CONT.

A: meiyou-ba (No) / dui-a (Yes)

B: na ni weishenme chuan yuyi a?
then you why wear raincoat A?
'Why are you wearing a raincoat?' **☑No # Yes**

[7] I'd like to clarify that unexpectedness can be resolved by different strategies (e.g., why questions), but if the speaker considers to use *nandao-Qs*, then learning the prejacent is necessary.

4 Proposal

4.1 Evidential signal in epistemic modality

I propose that *nandao* is an epistemic modal adverb whose role is to make sense of an **unexpected context** by **learning the prejacent**. We could follow a traditional Ktrazterian Modality Semantics, with additional adjustments to the conversational backgrounds. However, for the current proposal, we directly adopt the Kernel model from Von Fintel & Gillies (2010), who are looking at exactly the evidential signals in epistemic modals. Moreover, it provides a straightforward way for us to tackle the evidence in the immediate contexts and incorporate into our semantics.[8]

4.1.1 Kernel

Following Von Fintel & Gillies (2010)'s idea, Kernel represents the privileged information (i.e., very direct information in the context or follows from what is direct) in a contextually supplied modal base at the world.

> **Definition of Kernel and Base**: K is a kernel for B_K, B_K is determined by the kernel K, only if: Von Fintel & Gillies (2010, 25)
>
> i. K is a set of propositions (if $P \in K$ then $P \subseteq W$)
>
> ii. $B_K = \bigcap K$

4.2 Current proposal

Revision 1: Kernel Boundary After seeing a dripping raincoat, our Kernel, following their implementation, includes the proposition "people wear raincoats" and all propositions directly following this information (e.g., "it is rainy"). However, part of the constraints imposed by *nandao* stem from the speaker's not-direct-but-not-inferred knowledge (e.g., the inference "it is rainy" from the raincoat may not qualify as such knowledge when speaker thinks it is not rainy). While the original Kernel proposal is agnostic on this distinction, they also suggested that their original assumption can be removed. Thus, in addition to the Kernel's original definition, I introduce an upper bound $U \subseteq W$, representing the constraints of not-direct-but-not-inferred information. U should include the speaker's acquired knowledge, generalised knowledge and grammatical prior (i.e., basically the remainder knowledge). Otherwise, the Kernel is still a set of non-logically closed propositions that represent the privileged information-namely, the direct information from the immediate context and the propositions that follow from it.

(18) Revised Kernel:

> **Definition of Kernel and Base**: K is a kernel for B_K, B_K is determined by the kernel K, only if:
>
> i. K is a set of propositions (if $P \in K$ then $P \subseteq U$), $U \subseteq W$
>
> ii. $B_K = \bigcap K$

[8] One reviewer noted that adopting such a model would subject the current proposal to flaws of the Kernel model and debates therein. I agree that the strong and weak *must* is a debatable issue but this controversy shall not affect the current proposal in any regards.

Revision 2: Incompatible Kernel The evidential signals encoded by *nandao* are not like those by *must/might*, where the evidence is compatible with the speaker knowledge. Instead, the evidential signals are mirative ones, that said, the appearance of evidence is not expected by the speaker. Hence, I argue the semantics of *nandao* features an incompatible Kernel and propose its semantics in terms of the felicity condition illustrated below in (19):

(19) **Felicity condition of *nandao***: Fix a c-relevant kernel K:
   i. p is a piece of direct information in c and ϕ is one proposition that follows from p.
   ii. $[\![\textit{nandao}\ \phi?]\!]^{c,w}$ is only defined iff $(\bigcap K) \cap U = \varnothing$ and the speaker c_s needs to learns $[\![\phi]\!]^c$ such that $[\![\phi?]\!]^c$ is not directly settled in K to resolve the unexpectedness.

The interaction between the Kernel and the speaker's existing knowledge in *nandao*-Qs then can be described as follows: *nandao* is felicitous only if the speaker encounters an incompatibility between the updated Kernel (i.e., direct and inferred knowledge) and their background knowledge ($(\bigcap K) \cap U = \varnothing$). For instance, consider a scenario where the speaker's (default) belief is that A comes to work everyday ($U \subseteq [\![\neg p]\!]$). However, the Kernel contains direct information p ("A did not come to work"), which contradicts this belief. Additionally, other direct information, such as ϕ_i ("the reason people did not come to work is because they are sick"), forms part of the Kernel $(((U \setminus p) \cup_{i \in I} \phi_i))$[9].

To resolve this conflict, the speaker inquires about a proposition ϕ_j that follows from p but is not directly settled by the evidence in K. Upon confirmation from the addressee, the speaker's knowledge U and the Kernel are updated accordingly. However, the unexpectedness can only be resolved if ϕ_j is confirmed to be true, not its negation, as discussed[10]. Only when ϕ_j is confirmed to be true does the direct information become expected (i.e., of low information value). The speaker then updates U to U, ensuring $U \subseteq [\![\phi_j]\!]^c \cap [\![p]\!]^c$. Simultaneously, the Kernel adjusts to $\{\phi_j, p\}$, yielding $\bigcap K = [\![\phi_j]\!]^c \cap [\![p]\!]^c$, thus restoring compatibility: $(\bigcap K) \cap U \neq \varnothing$. Conversely, if ϕ_j is false, the direct information remains unexpected (i.e., of high information value) or becomes even more unexpected. In this case, U updates to U such that $U \subseteq [\![\neg\phi_j]\!]^c \cap [\![\neg p]\!]^c$. Here, ϕ_j no longer explains p, prompting an adjustment to the Kernel: $\{p, \neg\phi_j, ((U \setminus p) \cup_{i \in I, j \notin I} \phi_i)\}$. Consequently, $\bigcap K = \bigcup_{i \in I, j \notin I}((p \cap \neg\phi_j) \cap \phi_i)$, and $(\bigcap K) \cap U = \varnothing$. Thus, when *nandao*-Qs are rejected, the unexpectedness persists and even intensifies (e.g., from deviation of default assumption in (context 1 in 14) to a disblief (context 2 in 14)), prompting the speaker to further inquire about the evidence. This process demonstrates how *nandao*-Qs help the speaker reconcile new evidence with their existing knowledge by iteratively updating both the Kernel and their beliefs.

4.2.1 Motivation behind such a linguistic strategy

- As noted by Barker (2009) in his analysis of clarity and skepticism, "The evidence is available, the conclusion follows, but for some reason the addressee is hesitating to make that last step to the final conclusion. Perhaps they have a logic deficit, and can't compute the

[9] Here, I denotes the total number of inferential knowledge elements. If there is only one ϕ, it corresponds to a Kernel associated with *must*; if there are multiple ϕ, it relates to *might*.

[10] This also explains why *nandao*-Qs do not involve positive epistemic bias. If the speaker held such a bias, they would not use *nandao*-Qs to learn ϕ_j, as the evidence would already be of low information value to the speaker.

consequences of their own beliefs." This insight resonates with the hesitation seen in cases involving *nandao*-Qs. The hesitation arises from an epistemic incompatibility between the speaker's prior beliefs—whether explicit or implicit—and the contextual evidence.

- As Jing-Schmidt (2008) suggests, *nandao*-Qs function as a pragmatic tool reflecting human psychology: when faced with evidence that contradicts expectations, our usual way of thinking and feeling is challenged, making the situation seem suspicious or threatening to our beliefs and values.

5 Various uses and properties of *nandao*

5.1 *NANDAO* AND PQ SELECTION

The selectional property of *nandao*, which only selects for a polar question as its prejacent, is another puzzle. Previous accounts simply treat it as a presupposition, while I here attempt to give a more explanatory reason for that.

Let us consider *nandao-Qs* as a strategy to resolve the unexpectedness. If it is an optimal strategy, then we would expect/ensure it to necessarily address the problem. Based on the empirical profile it shows where the speaker needs to learn the prejacent to resolve the surprise, we formulate a necessary condition into its semantics. This phenomenon where a particle introduces a precondition to learn in order for the discourse to progress is not new, which has been studied in Theiler (2017). Incorporating an analogous account of that precondition particle, I re-formulate the felicity condition of *nandao*.

(20) **Felicity condition of *nandao***: Fix a c-relevant kernel K, p is a piece of direct information in c:

$[\![\textit{nandao}\, Q?]\!]^{c,w}$ is only defined iff:

i. $(\bigcap K) \cap U = \varnothing$

ii. c_s considers learning one instantiation (ϕ) of the highlighted[11] property of Q as a necessary precondition to settle the unexpectedness/proceed in discourse.
(Adapted from Theiler, 2017, 137)

iii. $\forall\, \phi \in$ highlighted property of Q, ϕ follows from p, and $?\phi$ is not directly settled by K.

[11] Simply speaking, a sentence highlights an n-property (n is the number of wh-elements in the sentnece), so a polar question highlights the prejacent while a wh-question like *what did he do?* highlights a one-place property (e.g., *He did shopping*, *He did homework*...). The highlighting notion is good at capturing the fact that *nandao*-Qs need to learn the prejacent (i.e., the highlighted content of a polar question) to resolve the unexpectedness. In Theiler (2017), the precondition particle is used when the speaker needs to necessarily confirm an the highlighted content of the question to make sense of the context. In a polar question setup, these two particle have very similar function. The key difference lies in that *nandao* cannot take a wh-question.

Scenario:
Let us reconsider the case where the speaker encounters the addressee wearing a raincoat and finds it unexpected. According to our definition, there are two requirements for the instantiation that speaker needs to learn: (1) ϕ_j must follow from p (the proposition following the raincoat), and (2) ϕ_j must not be directly settled by the evidence at hand.

5.1.1 When Q is a PQ

In simpler terms, ϕ_j represents one of many possible reasons for the raincoat but is not directly present in the immediate context. If the question Q is a polar question, there is only one instantiation of the highlighted property (e.g., ϕ_j). That said, there is only one proposition that suffices for the speaker to resolve his unexpectedness, thus learning this proposition is indeed necessary. This explains why polar questions are compatible with *nandao*, as observed.

(21) PQ

Nandao waimian xiayu-le ma? [Prejacent]
nandao outside fall.rain-PERF Y/N-Q

Aprox. 'Is it raining outside?'

5.1.2 When Q is a Wh-Q

In contrast, if Q is a wh-question, there are multiple instantiations of the highlighted property (e.g., $\phi_i, \phi_j, \ldots$). These instantiations should first satisfy the second condition, which however is already problematic for some wh-questions. For wh-questions headed by phrases other than *why*, the instantiations of their highlighted property often fail to meet the requirement that they follow from the evidence. For instance, in the case of weather-related inquiries, a wh-question like *what weather is it outside?* may have instantiations such as *It is rainy* or *It is snowy* that satisfy the condition, but others like *It is sunny* or *It is cloudy* do not. Consequently, asking such question by nature would not be an very effective strategy to resolve the speaker's unexpectedness.

(22) Wh-Q

Nandao waimian shenme tianqi? [1-place property]
nandao outside what weather

Int. 'What weather is it outside?'

Strategy Competition For a question like *why are you wearing a raincoat?*, all instantiations of the highlighted property (e.g., "It is rainy," "He went to a water park," etc.) satisfy the second condtion[12]. However, does learning one of these instantiations constitute a necessary condition? Perhaps not. Because in the case of *why*-questions, all of instantiations are sufficient to explain

[12] Ashwini Deo (p.c.) noted that why questions can have a mention-some reading, where the answer does not necessarily follow from the evidence. However, the why questions I address refer specifically to the exhaustive reading. Importantly, the mention-some reading fails to satisfy the second condition and is therefore excluded, leaving my overall argument unaffected.

the evidence, which then in turn makes none of them necessary to learn. This aligns with intuition: a *why*-question alone is sufficient to address the speaker's unexpectedness[13], making an additional strategy such as *nandao* to account for the unexpected information redundant or unnecessary. Last but not least, the reason *nandao* does not co-occur with declaratives is simply that declaratives are not a strategy to "learn" but to assert. In a nutshell, *nandao* functions just like the precondition particle, except it poses more constraints on the questions in terms of its highlighted content, which leads to different distributions.

5.2 *NANDAO* AND RHETORICAL QUESTIONS

nandao-Qs are frequently argued to appear in rhetorical contexts, even though the semantics does not explicitly point to rhetorical usage. By intution, it is not hard to draw connections between unexpected and rhetorical. Here I want to draw this connection by showing the contexts where *nandao-Qs* are also good environment for RhQs.

5.2.1 Farkas (2023)

Farkas (2023) defines two necessary conditions for a rhetorical question.

(23) a. Closed Question Condition: Farkas (2023, 9-10)
In order for a question to be interpreted as a RhQ, Sp must be taken as assuming that the issue raised by the question is closed in c_i. (A question expressing an issue I is closed in c iff $\forall p \in I$ such that $p \notin cg_c$, $p \cup cg_c$ is not d-consistent.)

b. Rhetorical Point Condition:
In order for a question to be interpretable as a RhQ, Sp must be taken as intending to convey a rhetorical point, i.e., as intending to persuade Ad of the truth of a proposition p by making Ad reach the conclusion that p is true on his own.

This means that the question is already settled by the common ground, or that adding any proposition from the question set (if we assume a question is a set of propositions) would result in doxastic inconsistency (i.e., it would contradict the speaker's doxastic base). In the meantime, the question is used to make a rhetorical point, aiming to persuade the addressee to conclude that a proposition p is true on their own.

5.2.2 Environment *nandao* is in

D-inconsistency *Nandao*-Qs inherently signal a state in which the speaker experiences epistemic incompatibility. As previously discussed, this incompatibility arises from either a grammatical prior or a state of disbelief—situations where the speaker's existing beliefs are challenged

[13] Why-questions are a common way for people to address and resolve their surprise. In this sense, why-questions and *nandao*-Qs are two strategies that operate in very similar contexts. The key differences between them likely include: (1) why-questions do not conventionally encode evidential signals, whereas *nandao*-Qs do; and (2) *nandao*-Qs are particularly suited for addressing a specific disbelief or unexpectedness the speaker experiences. Additionally, why-questions are not always used to inquire about something unknown or unexpected. For example, a teacher might ask their students a why-question simply to assess their understanding, rather than to resolve any personal surprise or uncertainty.

by direct information. Consequently, many instances of *nandao* usage involve what can be described as a d-inconsistent state. However, not all instances of *nandao-Qs* involve such a state (e.g., the cases where unexpectedness comes from grammatical prior, in which case introducing any proposition from the question into the common ground would not result in doxastic inconsistency).

(24) *nandao* $\sim$ d-inconsistency state

nandao-Qs are polar questions. In the meantime, rhetorical polar questions $?p$ always entail doxastic inconsistency because p and $\neg p$ cannot simultaneously coexist in the common ground. That said, if a speaker wants to use a rhetorical polar question, *nandao-Qs* are always good candidates.

Note there are the asymmetric implications:

(25) Closed PQ $\rightarrow$ d-inconsistency state
d-inconsistency state $\not\rightarrow$ Closed PQ

(26) Rhetorical PQ $\rightarrow$ Closed PQ
Closed PQ $\not\rightarrow$ Rhetorical PQ

Necessary but not sufficient for PQs to be closed
However, it is crucial to note that being in a d-inconsistent state is a necessary but not a sufficient condition for the use of rhetorical questions. Consider the weather inquiry example: the speaker believes it is not raining, but the direct information suggests otherwise. Although this scenario creates epistemic tension, the question cannot be classified as a closed one. This is because neither "it is raining" nor "it is not raining" is part of the common ground, so it is not the case that for all $p \in I$, if $p \notin cg_c$, then $p \cap cg_c$ is not d-consistent (e.g., the belief that it is not raining remains d-consistent). As such, the question is not closed, nor does it satisfy the criteria for being rhetorical.
Necessary but not sufficient for closed PQs to be RhQs
Always a rhetorical point!

Rhetorical Point The speaker persuades the addressee to reach the conclusion so that to feel the unexpectedness.

Strategic choice Speakers have strategies for addressing unexpectedness arising from direct information, as well as the flexibility to select which proposition they wish to learn. A speaker may choose a prejacent (i.e., ϕ) that contradicts the common ground (27) or one that does not (28), leading to different effects.

(27) A and B are talking about a colleague, Lee, who is going to work on Sunday. B does not think people usually go to work on Sunday.
A: Lee zhoumo ye dasuan qu shangban. ('Lee is planning to work on weekends too.')
B: nandao ta fafeng-le ma?
nandao he become.crazy-PERF Y/N-Q
Aprox. 'Is he crazy?'

(28) A and B are talking about a colleague, Lee, who is going to work on Sunday. B does not think people usually go to work on Sunday.
A: Lee zhoumo ye dasuan qu shangban. ('Lee is planning to work on weekends too.')
B: nandao ta heng.mang ma?
nandao he very.busy Y/N-Q
Aprox. 'Is he very busy?'

5.3 *NANDAO* AND BIAS

I have argued, the speaker's lack of expectation regarding the prejacent does not necessarily imply disbelief, nor does it mean that the unexpectedness is made public. This, however, does not mean I deny the possibility of conveying bias through this type of questions. Here I want to note that if we are interested in the bias introduced by *nandao*, then we may want to control for the bias that brought by polar questions themselves as debated in the bias literature (Sudo 2013; AnderBois 2019; Goodhue 2022; Rudin 2022 i.a.)

5.3.1 What is epistemic bias?

The original Epistemic bias is defined as follows:

> If a PQ carries an implication compatible with the positive (resp. negative) answer based on what the speaker believes, the PQ is said to carry positive (resp. negative) epistemic bias. Sudo (2013, 8).

Based purely on the definition, we can see the traditional notion of an epistemic bias is calculated w.r.t the speaker's doxastic base. This notion is followed by many subsequent works on bias without too much elaboration, including those work on *nandao* (e.g., Xu 2017).

Upshot *nandao-Qs* ask then such a question "should we also consider grammatical priors also a source of epistemic bias." Originally, this is a view from Van Rooy & Safarova (2003) who consider bias as the expected value of answer. That said, all polar questions, no matter what form, reflects the expected value of certain answer (either positve or negative). In that sense, all polar questions should be considered biased. However, whether or not this bias is an epistemic one, which subjects to further considerations. If we consider this as one sort of epistemic bias, then it rejects the so-called neutral polar questions. The current proposal is open to this controvesy. It then depends on whether one considers the grammatical prior (i.e., default expected value of the answer) as a bias. Given this bias is largely not perceived, I'd rather leave it aside, but even considering this as a kind of epistemic bias will also not affect my account, which puts the focus on more important evidential signals.

(29) A and B are talking about a colleague, Lee, who is going to work on Sunday. B does not think people usually go to work on Sunday.
A: Lee zhoumo ye dasuan qu shangban. ('Lee is planning to work on weekends too.')
B: nandao ta heng.mang ma?
nandao he very.busy Y/N-Q

Aprox. 'Is he very busy?'
$\not\rightarrow$ I believe he is not busy.
$\rightarrow$ It is not the case I (strongly) believe/expect he is busy.

5.3.2 Evidentiality and bias

Bhadra (2020) once made a connection between evidentiality and bias through the lens of interrogative flip in evidential marking languages. Her argument is that in a non-interrogative flip language, evidentiality is associated with an independent sourcehood. Therefore, we could possibly argue that the epistemic bias that the speakers feel in the use of *nandao* is generated through pragmatic reasoning such that the speakers considers themselves as the independent source of the information, given they are the source, they tend to think they are biased.

6 Distinctions with previous analyses

Start with conclusions: The current proposal is compatible with previous analyses but direct the focus from epistemic bias to evidential bias, and from bias towards prejacent to unexpected contextual evidence.

- The current analysis captures the determining role of contextual evidence in the use of *nandao-Qs*. This tells us the story that the unexpected evidence is the trigger while the unexpectedness in the prejacent (i.e., the speaker does not expect the prejacent) is a consequence following the evidence. The previous analyses offer a story on prejacent but the current analysis extends the story further.
- The current analysis offers more insights into the selectional property of the particle.
  - Why Polar Questions: The speaker needs to learn one instantiation of the highlighted property is a necessary condition (Optimal Strategy).
    [✓ current proposal, ✓ Aug]
  - Why not other questions: The instantiation of the highlighted property is either not following the evidence or is not a necessary one to learn.
    [✓ current proposal, ✘ Aug]
- The current analysis does not attribute the difference between the so-called biased questions and the rhetorical questions to the strength of bias. Instead, it shows that it is a strategic choice whether the speaker wants to make a rhetorical point. In the meantime, it draws link between unexpected state and the contexts where closed questions are defined.
- The current analysis is open to the state of epistemic bias that show up in *nandao-Qs*. The previous analysis where a normal ordering source is used over the speaker's epistemic state is also a fair treatment that captures the unexpectedness following the unexpected evidence.

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