

Belief revision and formation in grammar: The Japanese inferential evidential *no*

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Abstract

Japanese *no* is a pragmatic particle encoding **evidential meaning**. However, analyses of *no* as a general evidence marker are challenged by puzzling restrictions it imposes on mirative utterances. To account for these, we analyze *no* as a marker of **inferential evidence**, predicting how its meaning interacts with declaratives and interrogatives, and linking it to related uses of the complementizer. This is implemented as an establishedness restriction on the proffered content within a framework differentiating **premises and expectations** in addition to evidence and belief, thereby modeling the status of a proposition within processes of evidence-based belief revision and formation.

1 Overview

In section 2, we use mirative utterances with *no* as the core data point to generalize over extant evidence restrictions, propose a new, unified restriction to inferential evidence, and discuss connections between the particle and the complementizer *no*. In section 3, we sketch the premise-and-expectation framework used to analyze *no* in section 4, where we implement the inferential evidence requirement as a ban on content accepted as a premise before the utterance. Using this analysis, we account for various uses of the particle *no* in section 5, touching on soliloquous vs. discourse-oriented uses, interaction with the fellow pragmatic particles *yo* and *ne*, pragmatic reasoning and its use in the narration of belief revision, and how *no* is used in non-canonical assertions. Section 6 briefly discusses broader implications for linguistic theory.

2 What *no* does

While there is an emerging consensus in the formal literature that *no* carries evidential meaning, it is not clear what kind of evidence it marks. To address these questions, we examine the mirative

use of “*noda*-constructions”. These are assertions where *no* occurs with the copula *da*, which have been the main focal point of the extensive descriptive literature on Japanese *no* as both a complementizer (COMP) and a pragmatic particle (PRT). On their mirative use, they come with puzzling restrictions on evidence that cannot be explained by simply assuming, with a number of previous analyses, that *no* marks any kind of contextual evidence.

We propose that these restrictions can be accounted for by analyzing *no*(PRT) as a marker of inferential evidence for the utterance content, providing grounds for it within a process of belief revision and/or formation. This overlaps with, but is distinct from, *no*(COMP) as an elaboration marker.

2.1 Mirative utterances and *no*

In order to formulate our generalization on what type of evidence is marked by *no*(PRT), we build on observations by Oshima (2024) on *no* in mirative utterances. Oshima gives the following example for *no* as an obligatory mirative marker (we take it to be a more general evidence marker) expressing speaker surprise over an observed state of affairs (*i.e.* over contextual evidence):

Scenario Expecting A be away for fieldwork for another week, S sees A at the office and utters:

- (1) A, modot-teta ??(n da).
INTJ return-RES.PST *no* COP
“Oh, you’re back.”

In (1), evidence has just become available in the utterance situation that causes the speaker to revise a previous assumption and assert the prejacent¹ based on this evidence, which licenses *no*, rather than on a previously held conviction.

2.2 Generalizations on evidence restrictions

While the presence of evidence can thus license *no*, this is not the case for all types of evidence.

¹The propositional content of an utterance.

Oshima formulates two restrictions on evidence marked by *no* in mirative utterances building on [Noda \(1997\)](#)'s comprehensive observations on uses of *noda*-constructions. Below, we discuss these two restrictions and their limitations in turn, and suggest an alternative, unified generalization.

2.2.1 All-focus ban / QUD requirement

First, Oshima proposes that *no* as a mirative marker requires that there must be a “non-trivial” QUD² (more specific than “What’s up?”) regarding the prejacent. The following examples show cases where this is violated, the speaker is unlikely to have specific expectations about the prejacent:

Scenario Entering a hotel room right after checking in, S finds a dead cockroach on the bathroom floor.

- (2) A, gokiburi-ga shin-deru (?? n da).
INTJ cockroach-NOM die-RES.NPST *no* COP
“Oh, there’s a dead cockroach.”

The claim is that *no* is not licit in (2) because the discovery is too out-of-the-blue, as it is implausible that the speaker has wondered whether or not the prejacent holds before utterance time. This QUD requirement can be circumvented by having the scenario include a QUD answered by the prejacent:

Scenario S hears A scream, then fall silent. Rushing to the rescue, S finds A staring at a cockroach.

- (3) A, gokiburi-ga shin-deru ??(n da).
INTJ cockroach-NOM die-RES.NPST *no* COP
“Oh, there’s a dead cockroach.”

When a *why*-question to which the prejacent is the answer is made contextually salient, *no* is admissible in (3), parallel to the standard case of the mirative use of *no* in (1). However, as we argue in section 2.4.2, this can also be explained by an overlap with the explanation use of *no*(COMP).

2.2.2 Establishedness requirement

For the establishedness requirement, Oshima gives the following example, where the speaker likely has an expectation that they would make the train (otherwise the running would’ve been futile), so that the all-focus ban or QUD requirement is insufficient to explain the badness of *no*:

Scenario Running for a train, speaker and addressee miss it in the nick of time:

- (4) A, maniawa-na-katta (??n da).
INTJ make.it-NEG-PST *no* COP
“Ah, we didn’t make it.”

The claim of the establishment requirement is that the fact that the speaker has missed the train is too recently established, based on examples like the following variation with a modified context, where *no* is not only required, but preferred:

Scenario A leaves running for a train, comes back with a disappointed expression shortly thereafter:

- (5) A, yappari maniawa-na-katta ??(n da).
INTJ after.all make.it-NEG-PST *no* COP
“Ah, you didn’t make it after all.”

The claim is that in (5), the truth of the prejacent (A being late) has been established for a certain amount of time rather than immediately before the utterance as in (4). There is, however, another key difference: the speaker is inferring the truth of the prejacent from contextual evidence in (5), rather than direct experience as in (4). The following example controls for evidence type:

Scenario The speaker is on a team surveilling the addressee via CCTV. The addressee is running for a train and misses it in the nick of time:

- (6) A, maniawa-na-katta ??(n da).
INTJ make.it-NEG-PST *no* COP
“Ah, [they] didn’t make it.”

On this scenario, the truth of φ has become established just as it is being observed by the speaker, however this is not the speaker’s own experience, but an observation via visual evidence. As this licenses the use of *no*, it is likely that information source or processing type is the actual requirement, rather than establishedness. We propose that the reason *no* is bad in (4) as well as in (2) is that the evidence is too direct, without need for reasoning.

2.3 The inferential evidence requirement

We propose that the licensing requirements for mirative *no*(PRT) can be reduced to a requirement for a process evidence-based inference, and that this can be implemented as to a ban of direct acceptance of the prejacent. This covers both the QUD-requirement on (2) and the establishedness-requirement on (4): in either case, the directly observed state of affairs is identical to the prejacent, and therefore immediately accepted as a premise, rather than serving as grounds for belief revision and/or formation — there are no intermediate stages of reasoning required to license *no*(PRT). We label the type of evidence satisfying this **inferential evidence**, and briefly discuss our claim in the context of the literature on evidentiality.

²Question under discussion, cf. [Roberts \(2012\)](#).

In languages where the marking of information source is obligatory, “inference” (based on tangible evidence) and “assumption” (based on logical reasoning general knowledge) can be distinguished, cf. Aikhenvald et al. (2007). While *no*(PRT) is closer to the former in marking the presence of tangible evidence, it can also involve logical reasoning. However, these categories are not necessarily applicable to Japanese, evidential *no* is not part of a grammatical system of obligatory information source marking, making it an “evidential strategy” rather than a grammatical evidential. Aikhenvald (2004) proposes that *no* refers to “validation of information rather than the way it was obtained”³, which can be understood as encoding the status of information within a reasoning process. We take this to support our implementation of *no*(PRT)’s contribution in terms of non-establishedness of the prejacent rather than in terms of explicit limitations on information source.

Our inferential evidence is close in spirit to Lau and Rooryck (2017)’s definition of *indirect* evidentiality as arriving at a state of knowing through intermediate stages, where in *inferential* evidentiality these are stages of reasoning. We use the label *inferential* to highlight the necessity of a reasoning process and to indicate that there is no restriction on the source of evidence as such, but on its status within a belief revision and formation process.

2.4 Distinguishing *no*(PRT) from *no*(COMP)

The specific evidential restrictions on *no*(PRT) are likely to have developed in a process of pragmaticalization from discourse-connective uses of *no*(COMP), cf. Rieser (2017), and their functions can in some cases overlap, in particular where there is a linguistic antecedent whose prejacent refers to inferential evidence. In order to analyze *no*(PRT) as an independent lexical item, it is therefore crucial to distinguish it from *no*(COMP). Comparing falling interrogatives to assertions in mirative contexts provides some insights on this distinction.

2.4.1 Restrictions on *no*(PRT) in interrogatives

(7) through (9) show final falling (*i.e.* soliloquous) interrogatives in the mirative scenarios for from section 2.1. Whereas *no* was preferred in assertions in all three cases, it is actually **dispreferred** in (7), the core mirative example narrating evidence-based belief revision, but optional in (8) and (9).

³Albeit based on observations by Aoki (1986) which do not make reference to the specific restrictions discussed here.

Scenario Expecting A be away for fieldwork for another week, S sees A at the office and utters:

- (7) A, modot-teta (?no) ka.
INTJ return-RES.PST *no* INT
“Oh, are you back.”

Scenario S hears A scream, then fall silent. Rushing to the rescue, S finds A staring at a cockroach:

- (8) A, gokiburi-ga shin-deru (no) (ka).
INTJ cockroach-NOM die-RES.NPST *no* INT
“Oh, is there a dead cockroach.”

Scenario A leaves running for a train, comes back with a disappointed expression shortly thereafter:

- (9) A, yappari maniawa-na-katta (no) ka.
INTJ after.all make.it-NEG-PST *no* INT
“Ah, did you not make it after all.”

We take this to show that *no*(PRT) is dispreferred in mirative falling interrogatives (we return to reasons for this in section 5), in contrast to mirative assertions. This raises the question of why *no* is optional in (8) and (9), examples where the alleged QUD- and establishment requirements are contextually satisfied. On our view, this is because the functions of *no*(COMP) and *no*(PRT) overlap, and the explanation / elaboration functions of the former are licensed in (8) and (9), but not in (7).

2.4.2 Explanation, elaboration, evidentiality

Table 1 relates functions of *no*(COMP) to evidence-marking by *no*(PRT): φ is the *no*-utterance’s prejacent, ψ a contextually salient proposition, and ε (inferential) evidence. These are related by defeasible entailment \rightsquigarrow , to be specified in the analysis.

<i>no</i> (COMP)	explanation	$\exists\psi : \varphi \rightsquigarrow \psi$
	elaboration	$\exists\psi : \psi \rightsquigarrow \varphi$
<i>no</i> (PRT)	evidential	$\exists\varepsilon : \varepsilon \rightsquigarrow \varphi$

Table 1 Functions of *no*(COMP) and *no*(PRT)

Note that *no*(COMP) functions as both an explanation and elaboration marker, whereas evidence-marking with *no*(PRT) is related to elaboration⁴ with the added restriction to inferential evidence. In (8), the scream (ψ) is explained by the cockroach in (φ), and in (9), the long face (ψ) is explained by the failure to make it (φ), *i.e.* these are cases of explanation by *no*(COMP) rather than evidence-marking by *no*(PRT), which is not licensed.

⁴While explanation is a cross-linguistically common function of complementizer constructions, including English “It’s that.../Is it that...?”, elaboration is more rare but fully productive for *no*(COMP), which is likely what made bridging contexts for development of its evidential function available. For more detailed discussion, cf. Rieser (2024).

3 The expectative framework

We model the evidential restrictions from *no* in a framework that differentiates between **premises** (what an agent takes as a basis for inferential reasoning) and **expectations** (what an agent assumes to hold by default based on premises, but is not a premise in itself). Within this framework, evidence is a subset of premises, which also include established speaker beliefs, so that expectations arise from both evidence and extant beliefs, reflecting the role of evidence in belief formation and revision. This allows modeling inferential evidence marking as *no*(PRT) requiring grounds (evidence) to expect the prejacent, along with a ban on prejacent that are speaker premises (beliefs) before utterance, requiring an inferential process to be in progress at utterance time.

3.1 Premises and expectations

(10) defines the set of x 's premises Π^x as all propositions π that x believes to be true, written as $B_x\pi$. (11) defines the set of x 's expectations Ξ^x as all propositions ξ that x believes to normally hold, written with the normality modal OUGHT⁵. The overall context C^x is defined as their union in (12).

- $$\begin{aligned} (10) \quad \Pi^x &= \{\pi \mid B_x(\pi)\} \\ (11) \quad \Xi^x &= \{\xi \mid B_x\text{OUGHT}(\xi)\} \\ (12) \quad C^x &= \Pi^x \cup \Xi^x \end{aligned}$$

3.2 Evidence

(13) defines E^x , the set of evidence available to x , as subset of Π^x containing all evidence (represented as propositions) ε ⁶ that are premises of x and support (an) expectation(s) of x .

(13) $E^x \subset \Pi^x = \{\varepsilon \mid \varepsilon \in \Pi^x \wedge \exists \xi \in \Xi^x : \varepsilon \rightsquigarrow \xi\}$
Evidence giving rise to an expectation is written as \rightsquigarrow , introduced above to describe the explanation, elaboration, and evidentiality uses of *no*. As a conditional relation, this is equivalent to restriction of OUGHT's modal base with φ ⁷, written as Ξ_φ in (14). Note that, when restriction of the modal base with φ gives rise to any expectations, this makes φ evidence per the definition in (13).

- $$(14) \quad \Xi_\varphi^x = \Xi^x \cup \{\xi \mid \varphi \rightsquigarrow \xi\}$$

⁵Cf. Yalcin (2016), Rieser (2020a) for analyses of OUGHT as a normality modal rather than "weak epistemic modality".

⁶ E^x should also include source and reliability information to account for core grammatical evidentials and cases of conflicting evidence. As this is not relevant for evidence restrictions from *no*(PRT), they are not formally implemented.

⁷This treats conditionals as modals, cf. Kratzer (2012).

3.3 Context update

In order to reflect narration of belief revision and formation by *no*, we model utterances as context change potentials (CCPs)⁸, where conditions on an input context set C^x are paired with an update output context set C'^x . This is implemented as in (15), where an utterance U with a prejacent p is defined as a set of pairs of input and output contexts which are admissible as they comply with the felicity conditions in F^U characteristic to U (for our purposes, DEC or INT). Pragmatic particles are defined as utterance modifiers that add felicity conditions F^{PRT} , which have to be compatible with the original felicity conditions of the utterance.

- $$\begin{aligned} (15) \quad \llbracket U(p) \rrbracket &= \{\langle C^x, C'^x \rangle \mid F^U\} \\ (16) \quad \llbracket \text{PRT}[U(p)] \rrbracket &= \{\langle C^x, C'^x \rangle \mid F^U \cup F^{\text{PRT}}\} \end{aligned}$$

The CCPs of *no* in a falling interrogative and in an assertion (falling declarative) are given in (17) and (18), where x is resolved to the speaker S . Conditions on subsets of the input and output contexts are written as Π^{C^x} and $\Pi^{C'^x}$, respectively.

- $$\begin{aligned} (17) \quad \llbracket \text{no}(\text{INT}(p)) \rrbracket &= \{\langle C^x, C'^x \rangle \mid \\ &\quad \mid \exists \varepsilon \in E^{C^x} : p \in \Xi_\varepsilon^x \wedge p \notin \Pi^{C'^x}\} \\ (18) \quad \llbracket \text{no}(\text{DEC}(p)) \rrbracket &= \{\langle C^x, C'^x \rangle \mid \\ &\quad \mid \exists \varepsilon \in E^{C^x} : p \in \Xi_\varepsilon^x \wedge \neg p \notin \Pi^{C^x} \wedge p \notin \Pi^{C'^x}\} \end{aligned}$$

For the following discussion of interactions with other pragmatic particles and discourse-oriented uses of *no*(PRT), we only give the felicity conditions F for each example without the full CCP notation for ease of exposition.

4 Expectative analysis of *no*

These definitions in places, we model the restrictions that *no*(PRT) imposes on the utterance context as the two pragmatic presuppositions in Table 2.

	pres 1	pres 2
$\text{no}(p)$	$p \in \Xi_E^x$	$p \notin \Pi^x$

Table 2 Restrictions from *no*(PRT)

Presupposition 1 requires evidence in the utterance context that supports an expectation that the prejacent holds. This is written as p being a member of x 's evidence-based expectation set Ξ_E^x . Presupposition 2 is a requirement that at first seems unrelated to the type of evidence, stating that the prejacent cannot be a premise in the input context.

⁸See Heim (1983) for the basic concept, Davis (2011) for an application to pragmatic particles in Japanese.

4.1 Relating the prejacent

Presupposition 1 links the prejacent of *no*(PRT) to elaboration by *no*(COMP): the latter relates the prejacent to a contextually salient utterance, the former to evidence. Table 3 translates the definition from Table 1 into our framework, yielding presupposition 1 as a context restriction on *no*(PRT).

	general	context restriction
elaboration	$\exists\psi : \psi \rightsquigarrow \varphi$	$\exists q \in \Pi^x : p \in \Xi_q^x$
evidential	$\exists\varepsilon : \varepsilon \rightsquigarrow \varphi$	$\exists\varepsilon \in \Pi^x : p \in \Xi_\varepsilon^x$

Table 3 Restrictions from *no*(COMP) and *no*(PRT).

4.2 Restricting *no*(PRT) to inferential evidence

Presupposition 2 restricts evidence that can license *no*(PRT) to **inferential evidence** by banning prejacent already accepted at utterance time ($p \notin \Pi^x$) — in an inference process, evidence is not directly accepted as a belief, but used as grounds for deciding whether to accept an expectation arising from it. In the mirative case, the observed evidence is the basis of a process by which an expectation to the contrary is discarded and replaced by a new premise, *i.e.* a belief revision process is narrated by the *no*(PRT) utterance.

The indirect implementation of inferential evidence, rather than direct restriction of admissible types of ε , is not only welcome from the perspective of formal parsimony (the machinery is needed for capturing functions of speech acts and other particles), but also as Japanese does not mandatorily and unambiguously restrict evidence by modality⁹.

4.3 Declaratives, interrogatives, and *no*(PRT)

The analysis of *no*(PRT) proposed above readily captures its interaction with declarative (*da*) and interrogative (*ka*) morphology, as summarized in Table 4. Note that the presupposition of *no* overlaps with DEC in requiring evidence (grounds) supporting the prejacent, and with INT in requiring the prejacent *not* to be a premise before utterance.

	presupposition	update
<i>no</i> (<i>p</i>)	$p \in \Xi_E^x \wedge p \notin \Pi^x$	–
<i>ka</i> (<i>p</i>)	$p \notin \Pi^x$	–
<i>da</i> (<i>p</i>)	$p \in \Xi_E^x \wedge \neg p \notin \Pi^x$	$p \in \Pi^x$

Table 4 Restrictions from *no*(PRT), INT, and DEC.

⁹Apparent markers of visual evidence (*mitai*, *yooda*) or hearsay evidence (*rashii*, *sooda*) are ambiguous with inference or quotation marking, suggesting there is no direct grammatical restriction of evidence source in Japanese.

5 Accounting for uses of *no*(PRT)

Interaction with *da*(DEC) and *ka*(INT) sheds light on how *no*(PRT) is licensed in mirative scenarios — to illustrate, (19) is repeated from (1) and (7).

Scenario Expecting A be away for fieldwork for another week, S sees A at the office and utters:

(19) A, modot-teta {??(n da)/(?no) ka?}.
INTJ return-RES.PST no COP no INT

The scenario for (19) is one of belief revision: speaker *S* revises an expectation $\neg p$ to a belief *p*. Under this scenario, *no* is preferred in the declarative, but dispreferred in the interrogative. We propose that the contrast in acceptability of *no* can be accounted for by considering how its meaning overlaps with that of its host utterances.

In the declarative utterance, the presence of evidence is already marked by *da*(DEC), so that *no*(PRT) contributes the condition that *p* not be a premise before utterance ($p \notin \Pi^S$), *i.e.* the restriction to inferential evidence that we have argued above explains its badness where *p* is directly accepted as a premise. That marking evidence as inferential with *no*(PRT) is strongly preferred here rather than just optional is due to pragmatic reasoning, in particular the principle of MAXIMIZE PRESUPPOSITION, as discussed in section 5.2.

In the interrogative utterance, the non-premise status of *p* is already marked by *ka*(INT), so that *no*(PRT) would contribute the condition that there be evidence making *p* expected in the utterance situation ($p \in \Xi_E^S$). Marking inferential evidence with *no* is dispreferred in absence of an indication of revision to *p*, as this would imply sustained speaker doubt, incompatible with the scenario.

Our claim that the licensing of *no* in mirative scenarios depends on an indication of belief revision is supported by the observation that *no* is optional in falling interrogatives when the particle *yo* is added to mark imminent belief revision (see section 5.1.1). This, in turn, supports our claim that, in mirative declaratives, *no* is strongly preferred as it marks evidence as inferential — the non-premise condition is also marked by *ka*(INT), so that *no* is optional rather than preferred in *yo*-interrogatives.

In the remainder of this section, we apply our analysis to more uses of *no*(PRT), discussing discourse-oriented *vs.* soliloquous uses and interaction of *no* with the particles *yo* and *no* (5.1), the role of pragmatic reasoning in narrating belief revision and conveying bias (5.2), and *no* in non-canonical (directive and commissive) assertions (5.3).

5.1 Discourse, soliloquy, and evidence

Oshima (2024) gives two discourse-oriented versions of the original mirative assertion, illustrating how *no* interacts with the particles *ne* and *yo*:

Scenario Expecting A be away for fieldwork for another week, S sees A at the office and utters:

- (20) A, modot-teta ??(n da) ne.↑
INTJ return-RES.PST no COP ne
“Oh, you’re back.”

Scenario S has learned that Mari is back in the office an hour ago. A says “I wonder when Mari will come back.”

- (21) Moo modotteki-teiru (??n da) yo.
already return-RES.NPST no COP yo
“She is back already.”

In (20), directed at the returnee, *ne* indicates that addressee A is already aware of prejacent *p*, and *no* is preferred, as in the original mirative assertion. In (21), directed at a third party, *yo* indicates that A is not yet aware of *p*, and *no* is dispreferred. Below, we show how to account for this contrast in our framework, and how *no* can be licensed with *yo*.

5.1.1 Interaction with *yo* and *ne*

The expectative framework models how *no*(PRT) interacts with the particles *yo* and *ne*, in addition to *ka*(INT) and *da*(DEC). Table 5 shows context restrictions for *yo* and *ne* based on Rieser (2020b), along with definitions repeated from Table 4.

	presupposition	update
<i>no</i> (<i>p</i>)	$p \in \Xi_E^x \wedge p \notin \Pi^x$	–
<i>ka</i> (<i>p</i>)	$p \notin \Pi^x$	–
<i>da</i> (<i>p</i>)	$p \in \Xi_E^x \wedge \neg p \notin \Pi^x$	$p \in \Pi^x$
<i>yo</i> (<i>p</i>)	$p \notin \Xi_\Pi^x$	$p \in \Xi_\Pi^x$
<i>ne</i> (<i>p</i>)	$p \in \Xi^x$	–

Table 5 Restrictions from *no*, *ka*, *da*, *yo* and *ne*.

In (20), *ne*↑ forces discourse-orientation as rising intonation (↑) resolves *x* in the presupposition to A, resulting in the CCP restrictions in (22).

- (22) $p \in \Xi_E^{C^S} \wedge \neg p \notin \Pi^{C^S} \wedge p \notin \Xi^{C^A} \wedge p \in \Pi^{C'^S}$

In (20), the evidence requirements from DEC and *no*(PRT) overlap: $p \in \Xi_E^{C^S}$ is part of utterance meaning without *no*, which only contributes $p \notin \Pi^S$, i.e. restriction to inferential evidence. Marking inferential evidence is preferred, in parallel to the soliloquous version of (20) without *ne*.

In (21), *yo* indicates the addressee is not expecting the prejacent, and updates the addressee’s premises with the speaker’s assertion,

presented as grounds for expecting p^{10} , resulting in the CCP restrictions in (23).

- (23) $p \in \Xi_E^{C^S} \wedge \neg p \notin \Pi^{C^S} \wedge p \notin \Xi^{C^A} \wedge p \in \Pi^{C'^S} \wedge p \in \Xi_\Pi^{C'^A}$

Here, *no*(PRT) is strongly dispreferred due to the inferential evidence being incompatible with *p* being a premise, as required by the scenario.

5.1.2 Shifting the locus of evidence

The following scenario for (21) makes *no*(PRT) acceptable with *yo* by shifting the locus of evidence:

Scenario S has learned that Mari is back in the office an hour ago, as both S and A have seen her. A says “I wonder when Mari will come back.”

- (24) Moo modotteki-teiru ??(n da) yo.
already return-RES.NPST no COP yo
“She is back already.”

The underlined part of the scenario states that evidence for the truth of the prejacent is also available to the addressee in addition to the speaker, making *no*(PRT) is preferred in (24), in contrast to (21). On our analysis, this *no*(PRT)’s participant variable being resolved to the addressee, resulting in the additional restrictions from *no*(PRT) in (25).

- (25) $p \in \Xi_E^{C^A} \wedge p \notin \Pi^{C^A}$

Together with the conditions from *yo*-assertion in (23), (25) indicates that both participants have evidence for the prejacent ($p \in \Xi_E^{C^S, A}$, as *x* is resolved to S in DEC, to A in *no*(PRT)). This contrasts with A neither having accepted *p* as a premise ($p \notin \Pi^{C^A}$) nor expecting it ($p \notin \Xi^{C^A}$). The speaker uses this to prompt the addressee to initiate a process of belief revision by retrieving the evidence available to them, making *p* expected ($p \in \Xi_\Pi^{C'^A}$), and setting it up for acceptance ($p \in \Pi^{C^S, A}$).

5.1.3 Interaction with *yo* in interrogatives

Recall that *no* was dispreferred in falling interrogatives in mirative scenarios, cf. (19). However, when *yo* is added, *no* becomes optional, as in this soliloquous example from Taniguchi (2016), where the speaker does not yet accept the prejacent as a premise, but is considering to do so:

Scenario S observes someone about to eat something S had thought unfit for human consumption:

- (26) Sonna mono taberu (no) ka yo.
such.a thing eat.NPST no INT yo
“[They’re] (not) going to eat that!?”

¹⁰Cf. Unger (2019)’s parallel account of how exclamative and mirative utterances can serve as evidence sources.

Recall that we have argued the badness of *no* in falling interrogatives is due to *ka*(INT) not marking the establishment of the prejacent *p* as a premise in contrast to the update $p \in \Pi^x$ from *da*(DEC). In (26), *yo* indicates establishment of *p* as an *expectation* ($p \in \Xi_{\Pi}^x$), making an (imminent) belief-revision reading available and licensing inferential evidence marking with *no*. The CCP restrictions from (26) on our analyses are shown as in (27). Note that the evidence requirement from *no*(PRT) is its only contribution, as $p \notin \Pi^{CS}$ is also encoded by INT.

$$(27) \quad p \notin \Pi^{CS} \wedge p \notin \Xi^{CS} \wedge p \in \Xi_E^{CS} \wedge p \in \Xi^{CS}$$

The input conditions contain an apparent contradiction between $p \notin \Xi^{CS}$ and $p \in \Xi_E^{CS}$, which reflects how (26) narrates the belief revision context: *S* not expect *p* based on previously entertained premises, but only on the basis of evidence that has become available in the utterance situation. The addition of *yo* licenses this interpretation, as it narrates evidence-based expectation formation.

Full formal reflection of this account of the interaction of *no*(PRT) and *yo* in falling interrogatives would require a full split of the expectative context into general and evidence-based expectation sets and/or a more detailed implementation of their interaction. However, as falling interrogatives with *yo*, are licensed in mirative contexts where the speaker does not believe or expect *p* (conditions from INT and *yo*), and contextual evidence supporting *p* comes up, there is pragmatic motivation to interpret *no*(PRT) as an indicator of relative evidence strength. Some support for this comes from the interaction of *no* with bias patterns of polar interrogatives discussed in 5.2.2.

5.2 Narrating belief revision and formation

Our analysis directly accounts for *no*(PRT) not being licensed when the prejacent is directly accepted via the evidence requirement formulated in section 2.3, implemented as in 4.2. In our account of the felicity of *no* in its different uses, we have made reference to pragmatic reasoning to explain, among other contrasts, why *no* is preferred in mirative declaratives, but dispreferred in interrogatives in section 5. Below, we propose MAXIMIZE PRESUPPOSITION as the pragmatic principle behind these contrasts within the narration of belief revision, and discuss the related issue of evidential and epistemic bias marking in polar questions, which, as a corollary, related evidence-marking with *no*(PRT) to the elaboration function of *no*(COMP).

5.2.1 MAXIMIZE PRESUPPOSITION and *no*

The core example for narration of belief revision with *no*(PRT) and its licensing in declaratives vs. interrogatives is repeated in (28) from (19).

Scenario Expecting A be away for fieldwork for another week, S sees A at the office and utters:

(28) A, modot-teta {??(n da)/(?no) ka?}.
INTJ return-RES.PST no COP no INT

Starting from the preference for making the inferential evidence restriction explicit by adding *no*(PRT) to the declarative in (28) can be accounted for by in the spirit of the maxim MAXIMIZE PRESUPPOSITION¹¹ — the presupposition to be maximized in this case being the restrictions on the input context: while the bare utterance is principle compatible with a context in which the prejacent is not a speaker premise, the availability of *no*(PRT) to overtly mark this restriction makes it preferred.

As for the interrogative version of (28), we have argued that adding *no*(PRT) would mark the presence of evidence while no belief revision is made explicit, in conflict with a scenario where belief revision is taking place. From the perspective of maximizing context restrictions, an interrogative version of (28) is dispreferred when there is a declarative version available that makes revision explicit, although strictly speaking maximizing the update, rather than the presupposition, side of the CCP.

A possible counterexample to the maximization of explicit input restrictions is the case of falling interrogatives with *yo* discussed in section 5.1.3, where evidence-marking with *no* is optional, rather than preferred. We propose that this is due to it marking evidence in principle strong enough to make the prejacent a premise, the imminent revision scenario being on the borderline in terms of evidence strength.

5.2.2 Marking bias in polar questions

Another example for the role of pragmatic reasoning are negative polar questions, where *no* adds epistemic bias rather than the expected evidential bias, as in this example from Sudo (2013):

Scenario A, who heads a student meeting and knows who will be present, says: “We are all here now. Shall we start the meeting?”

(29) Daremo hokani ko-nai (no)?
nobody else come-NEG.NPST no
“{Is nobody else/Isn’t anyone else} coming?”

¹¹cf. Schlenker (2012) for a discussion in the context of pragmatic reasoning.

(29) without *no* indicates contextual evidence (in form of A's utterance) for the (negated) prejacent, giving rise to **evidential bias**, parallel to English "Is nobody else coming?". Marking of this evidence with *no* is optional and, when added, gives rise to **epistemic bias**, indicating there is a contrary speaker expectation, *i.e.* narrating revision of epistemic bias based on contextual evidence, parallel to English "Isn't anyone else coming?".

A similar effect occurs when *no* is added to falling interrogatives: *ka*(INT) encodes epistemic bias, *i.e.* that the speaker is reluctant to accept the prejacent, even in the face of evidence, making them incompatible with a belief-revision scenario. When *yo* is added to the interrogative to indicate expectation revision which includes epistemic bias, the addition of *no* adds evidential bias, indicating that belief revision is likely in light of the evidence.

Finally, note that *no* in (29) is actually ambiguous between COMP and PRT as there is a linguistic antecedent that the content of the question elaborates on. This is a likely bridging context for the development of *no*(PRT) as an evidential marker, underlining the importance of narration of (potential) belief revision for understanding its meaning.

5.3 Non-canonical assertions with *no*

The analysis of *no*(PRT) we propose is also able to account for two of its rather marked uses in assertions: the "order" (30) and "resolution" (31) uses, here in examples adapted from Oshima (2024):

Scenario S is a police officer arresting a suspect:

- (30) Te-o agete, kocchi-o muku ??(n da).
 hand-ACC lift here-ACC turn.NPST *no* COP
 "Lift your hands and turn over here."

Scenario S is psyching themselves up for a fight:

- (31) Ore-wa nantoshitemo, aitsu-ni katsu ??(n da).
 I-TOP do.whatever he-DAT win.NPST *no* COP
 "I'll beat him, no matter what it takes."

In both cases, the prejacent is not an accepted premise before the utterance, and assertion is used non-conventionally in directive and commissive illocutionary acts. Marking with *no*(PRT) makes the prejacent's status as non-premises explicit. Here, the goal of assertion is not to accept the prejacent based on evidence for their truth, but on grounds for directives and commissives, *i.e.* the speaker's volition. Thus, the utterances making their prejacent premises convey that addressee (30) or speaker (31) must adjust their course of action. As in mirative assertions, marking this update is preferred by MAXIMIZE PRESUPPOSITION.

6 Summary and outlook

We have analyzed *no*(PRT) by capturing the restrictions it imposes on admissible contexts within a framework differentiating between premises and the expectations based on them. On our analysis, *no*(PRT) is licensed by inferential evidence, modeled as a condition for the prejacent being an evidence-based expectation and a ban on the prejacent being accepted as a premise before utterance. As these conditions overlap with the declarative marker *da* and the interrogative marker *ka*, the analysis directly reflects their interactions with *no*, as well as connections to *no*(COMP) and the particles *yo* and *ne*, which we captured in the same framework. Our account of various uses of *no*(PRT) as narrations of evidence-based belief revision lays the groundwork for expansion of the analysis to other pragmatic particles, sentence-final expressions and evidential expressions, and development of the framework by formally reflecting evidence source, a finer-grained distinction of evidential and epistemic grounds, and pragmatic reasoning.

The premise- and expectation framework we propose formally captures evidentiality without hardcoding a reference to evidence source into the analysis. This is particularly relevant for analyzing grammatical evidence-marking that, like the inferential evidence requirement of *no*(PRT), encodes evidence for the prejacent within a process of belief formation rather than systematic and/or obligatory evidence source marking. This also connects to phenomena like the aforementioned negation in polar questions, including non-propositional negation, giving rise to evidential and epistemic bias patterns which are notoriously elusive but readily accountable as conditions on the prejacent as a (non-)premise or (non-)expectation in our framework. Finally, rethinking the traditional Gricean distinction between evidence and belief within a context split into premises (including evidence) and expectations, provides a novel way of formally capturing grounds for commitment to linguistic content, for instance what admissible evidence sufficient for asserting a prejacent is, and how linguistic antecedents can serve as, or be presented as, evidence within the discourse. This covers uses of pragmatic markers seeking to convince the addressee to accept the utterance context based on the speaker's assertion. Such uses are frequent, but often explained as "pragmatically marked" as they elude formal analysis.

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Glosses

ACC	accusative
COMP	complementizer
DAT	dative
DEC	declarative
INT	interrogative
INTJ	interjection
NOM	nominative
NEG	negation
NPST	non-past
PRT	particle
PST	past
RES	resultative
TOP	topic

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