Lo: mirativity on the table

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Goal: Using *lo*, a Hindi-Urdu discourse particle, as a case study, the present paper models mirativity within the Table model framework (Farkas and Bruce, 2010; Farkas and Roelofsen, 2017). In addition to the theoretical modeling contribution, the paper adds empirically to the recent work on Hindi-Urdu particles and discourse phenomena (Bhatt and Dayal, 2020; Deo, 2022, 2023a,b; Jabbar, 2023; Jabbar and Kanamarlapudi, 2023, 2024; Biezma et al., 2022).

Data: *lo*, a sentence-initial particle, occurs primarily in declaratives. To our knowledge, *lo* hasn't been discussed in the literature. First, we take it that *lo* is good in contexts where the speaker has a full commitment to the prejacent, as opposed to bias (Farkas and Roelofsen, 2017). This is illustrated by *lo*'s infelicity in (1), which includes an uncertainty marker *shayad* and (2), which includes a tag for confirmation, usually taken to signal strong bias (Farkas and Roelofsen, 2017; Goodhue, 2018).

(1) # Lo, bahar shayad barish ho rahi hai.
LO, *it might be raining outside*.

(2) # Lo, bahar barish ho rahi hai, nahi?
LO, *it's raining outside, no/isn't it?*

To contrast (1) and (2) with felicitous uses, consider (3) and (4) where the speaker commits to the prejacent.

(3) CONTEXT: *A expects B to come home at 6pm (the usual) everyday. B comes home at 4pm today. A says*:
A: Lo, tum (to 4 baje) aa gae (aaj).
A: LO, *you're home (at 4pm today).*

(4) CONTEXT: *A expects B to come back from work at 4pm. B emerges from his room at 4pm (B slept all day). A says:*
A: lo, tum to kaam par gae hi nahi.
A: LO, *you didn't even go to work (today).*

Moreover, *lo* requires some sort of discovery that may vary in its surprise as illustrated in the range of low and high surprise in (3) and (4) respectively. We analyze this varied discovery as the following condition: the speaker is not biased towards the prejacent p before committing to p's truth. This analysis can pointedly be corroborated via (5) as said by A. In (5), the speaker indicates bias with the first statement.

(5) Mujhe lagta hai ki bahar barish ho rahi hai. (*Looks out to confirm*) # Lo, bahar barish ho rahi hai.
I think it's raining outside. (Looks out to confirm) # LO*, it's raining outside.*

The sequence of the two utterances as in (5) itself is ok; for instance, instead of *lo*, one can felicitously substitute *haan* (*yes*) in (5). Further, *lo* doesn't require that the speaker had low or zero credence in the prejacent. It just requires that the credence not be high before the speaker commits fully. We mention this because often times agents' belief states aren't sensitive to certain questions and thereby propositions (Yalcin, 2012, 2018). For instance, A and B might be going to a party. They haven't entertained the proposition that Chris is at the party. A has assigned neither low nor high credence to the proposition. There simply is no credence assignment. In such a case, it is ok to say (6).

(6) **A** (upon entering the party, A sees Chris): Lo, Chris (bhi) party par hai.
A: LO, *Chris is (also) at the party*.

We now make another empirical observation about *lo*'s distribution. First, *lo* is also the imperative form of the verb *take* in Hindi-Urdu. It is hard to tease apart if there is indeed a sense of *lo* separate from the imperative verb form that features sentence-initially in imperatives. *Lo* seems to occur in imperatives like (7), but *lo*'s badness in (8) suggests that the speaker has to be handing over something to the addressee, while using *lo*, which points to this use under the *take* sense of *lo*. While there is strong reason to not take *lo* in (7) as being used under the discourse particle sense, we remain open to the contrary. This way, our current work can be taken as understanding *lo*'s distribution within a particular clause-type, the declarative.

(7) CONTEXT: *At dinner, B complains that there are only naans and no rotis. A cooks a roti. While handing over the roti to B, A says*:
A: Lo, yeh khaao!
A: LO, *eat this!*

(8) CONTEXT: A is babysitting B. B is doodling on their notebook, but not doing any work.
A: # Lo, kaam karo apna!
A: # LO, *do your work!*

Proposal: Informally, our account can be stated as follows: in using *lo*, the speaker signals that the speaker hadn't assigned a moderate to high credence to p before committing to p. We talk in terms of high, moderate, and low credences as heuristics, as also done in Farkas and Roelofsen (2017). Before we formalize, we show how the semantic distribution is derived from our account. In (1) and (2), the speaker signals a moderate to high credence in the prejacent without commitment. In (3) and (4), the speaker commits to the prejacent by way of assertion, with the context providing no reason for the speaker to assign moderate to high credence. To make precise our talk of *moderate to high credence*, we present a formalization below.

Formalization: The extended table model includes evidenced possibilities E, in addition to discourse commitments (*DC*) and the usual components such as the common ground, context set, etc. $E(A)$, introduced to differentiate bias from commitment, is simply the set of pairs like $(p, [\mathsf{moderate}, \mathsf{high}])$ which encode A's credence interval for p. We propose an enrichment: that propositions in *DC* and pairs in E come with time-stamps. Note that this is different from propositions construed as world-time pairs, as time-stamps are supposed to carry information for when propositions or pairs like $(p, [\mathsf{moderate}, \mathsf{high}])$ **entered** *DC* and E respectively, not what times make them true. These time-stamps can slice time as thinly as one wishes; propositions might be time-stamped for the day they entered *DC* or for the entering hour. We only make the cognitively plausible assumption that time-stamps be identified with discretized units of continuous times. Let these units constitute a set *T* of times t. Further, we presume a total order on *T*. *DC* then is a map from the set of speakers X to sets of pairs of propositions and ts; *DC*: $X \rightarrow \mathcal{P}(\mathcal{P}(W) \times T)$. To illustrate, if $\langle p, t_{-1}\rangle$ is in DC_A, then A publicly committed to p at t_{-1}. Note that this is different from saying that A is publicly committed to p at t_{-1}—although this follows from A publicly committing to p at t_{-1}. For E, these pairs will contain pairs within them as in $\langle (p, [\mathsf{low}, \mathsf{moderate}]), t_0\rangle$. We can motivate our enrichment independently; interlocutors do keep track of information about when speakers make their commitments, as evidenced by the appropriateness of retraction (that occurs at a time after the assertion of the content retracted) and the weirdness associated with asserting contradictory statements as they commit speakers to contradictory propositions at *one time*. We build on this theoretical enrichment to propose a semantics for *lo* in terms of what it signals. Where A is the speaker, A's use of *lo-s* (where s is *lo*'s containing clause and $[\![s]\!] = p$) at t_0 signals that $\langle p, t_0\rangle \in DC_A$ and $\neg(\langle (p, [\mathsf{moderate}, \mathsf{high}]), t_{-1}\rangle \in E_A)$.

A cross-linguistic mirative range: There are other particles like the English *whoa/woah* that also encode mirativity. However, note that *lo* and *whoa* vary in their distribution. *Whoa* cannot be used in (6), unless Chris's presence is surprising. On the other hand, *lo* can be used to note mundane states and events as in (6) (we can stipulate Chris's presence at the party to be business as usual in (6); the bare realization of it makes *lo* felicitous). The necessary condition of surprise for *whoa* can be captured via our extension of the Table model too. In addition to *whoa*'s prejacent becoming speaker commitment at t_0 the time of utterance, *whoa* may signal that the pair $\langle (p, [\mathsf{zero}, \mathsf{low}]), t_{-1}\rangle$ was in $E_{speaker}$ or that $DC_{speaker}$ contained $\neg p$. Of course, this is only a tentative analysis for *whoa*, presented only to compare it to our account for *lo*, and explain how the distributional differences between *lo* and *whoa* might emerge. This also points to the potential generalizablity of our account beyond *lo*.

Relation to other Hindi-Urdu particles: It is noteworthy that speakers often use *lo* with *bhi*, *hi*, and *to* as in (3), (4), and (6). Second, standardly discourse and question particles (consider *na* and *kya*) occupy sentence-final (along with initial and medial) positions in Hindi-Urdu. For *kya*, the sentence-final position is derived by positing TP-scrambling to the specifier of the Force projection headed by *kya* (Bhatt and Dayal, 2020). *Lo* doesn't occur sentence-finally. In the full paper, we leverage these comparisons and present more data featuring *lo* to further understand its semantics and the Hindi-Urdu left-periphery more broadly; we

also compare our account to Kraus (2019), which also models mirativity using the table model.

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