Biased polar question forms in NGT: The function of headshake

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Background and objective. It is often claimed that polar questions in sign languages are marked by raised eyebrows, in addition to other typical non-manual markers (NMM) including wide-opened eyes, addressee eye contact, and body/head forward position (e.g. Zeshan 2004). However, many experimental and corpus-based studies report decidedly more variation, including in brow position (e.g. Coerts 1992; De Vos et al. 2009 for NGT). We hypothesize that at least part of this variation can be accounted for by taking *bias* into account. As far as we know, only three sign language studies (Cañas Peña 2019 for Catalan SL; Gökgöz & Wilbur 2017 for Turkish SL; Sze & Lee 2023 for Hong Kong SL), based on elicitation and judgment data, have previously addressed the role of bias in question forms.

We designed a production task manipulating a signer's *original speaker belief* (SB) about a certain proposition p established before the current situational and conversational context, and *contextual evidence* (CE) concerning p directly provided within that context to investigate how these factors influence the form of a polar question in NGT about the truth or falsity of p. This allows us to identify different polar question forms that are used in NGT, and how these question forms are conditioned by prior speaker expectations and contextual evidence. We investigate both manual and non-manual markers. In the present paper, we focus specifically on question forms that include *headshake*, the main marker for negation in NGT (e.g. Coerts 1992; Oomen & Pfau 2017), since biased question forms often involve negation across languages (e.g. 'Don't you have a car?'; 'You have a car, don't you?'). We identify several question forms in which headshake occurs, and determine the range of contexts in which these forms are used.

Experimental setup. Data were elicited from 6 deaf NGT signers in a controlled production experiment. We manipulated SB and CE to elicit biased question forms in NGT. The study design was based on work by Domaneschi et al. (2017) on biased polar questions in English and German, which in turn builds on Roelofsen et al. (2013). In a role-play setting, we prompted participants to ask questions to two confederates, both deaf signers of NGT, whose responses introduced different SB and CE (+, 0, –). These exchanges were designed to trigger a target question directed toward the second confederate at the end of each role play. All participant utterances were video-recorded and target items were prepared for analysis in ELAN. From each participant, we elicited 30 target items across 7 conditions (different combinations of +/0/– SB and CE, excluding the ++ and −− conditions since they make polar questions unnatural to ask), for a total of 210 items. Nine items had to be discarded. In ELAN, we added ID-glosses for manual signs, detailed annotations for a wide range of non-manual markers, and annotations to indicate potential manual markers of question forms (e.g. PALM-UP). We then selected all question forms containing headshake for the current analysis. The table on the right indicates how many question forms with headshake were identified for each condition.

	SB		
CE	+	0	-
+		2/29	6/28
0	6/29	11/30	14/29
-	18/29	25/27	

Results. We analyzed all elicited constructions for (i) NMM patterns; (ii) their general sentence structure; and (iii) function and place of occurrence of the headshake.

NMM. There is much more to say about NMM than space allows here, but we will highlight three key observations. First, *almost all* analyzed items involve either brow lowering or inner brow raise, with full brow raise attested rarely. We propose that these non-raised brow configurations, which typically coincide with eye squint, are markers of *uncertainty* about the question radical. These NMM occur across all experimental conditions, although with somewhat lower frequency in [-SB,+CE] and [0SB,-CE]. Second, in conditions [-SB,+CE] and [+SB,-CE], we

frequently attested the NMM 'head up' (combined with the general question NMM 'head forward'; see below) and 'nose wrinkle'; these appear to signal *unexpectedness* of the question radical. Third, the most consistently attested NMM across all items and conditions is a head or body forward position. This contrasts with what Cañas Peña (2019) reports for Catalan SL, where she found backward head/body position in conditions with negative CE.

Sentence structure. In (1) to (5) below, we list the most common elicited question-type forms (we count any utterance inviting a yes/no response as a question-type form), with representative examples. For reasons of space, we do not gloss NMM other than headshake ('hs'), but see above for discussion. In the tables below, dark gray cells indicate the conditions in which the question type forms (1)-(5) were attested. We discuss the distributions further below.

(1) **Negative sentence radical with inquisitive NMM (not glossed):**
ENTRANCE $\overline{\text{FREE-OF-CHARGE}}^{\text{hs}}$ 'Is entrance not free of charge?'

(2) **Negative sentence radical + RIGHT:**
$\overline{\text{KIM HOME,}}^{\text{hs}}$ RIGHT PALM-UP 'Kim isn't home, right?'

(3) **Positive sentence radical + mouthed 'or not':**
KIM IX$_3$ VEGETARIAN $\overline{\text{INDEX}_3}^{\text{'or not', hs}}$ 'Is Kim a vegetarian or not?'

(4) **Positive sentence radical + inquisitive headshake**:
IX$_3$ SUNDAY ZOO OPEN $\overline{\text{HESITATE}}^{\text{hs}}$ 'Is the zoo open on Sunday?'

(5) **Negative sentence radical + inquisitive headshake**:
IX$_3$ SUNDAY ZOO $\overline{\text{OPEN}}^{\text{hs}}$ $\overline{\text{HESITATE}}^{\text{hs}}$ 'Is the zoo not open on Sunday?'

(1)

	SB		
CE	+	0	-
+			
0			
-			

(2)

	SB		
CE	+	0	-
+			
0			
-			

(3)

	SB		
CE	+	0	-
+			
0			
-			

(4)

	SB		
CE	+	0	-
+			
0			
-			

(5)

	SB		
CE	+	0	-
+			
0			
-			

Functions of headshake. We can identify two main functions. In forms (1)-(3), headshake signals negation (a manual negator is optional in NGT). Note that in (1)-(2), headshake negates the sentence radical, while in (3) it does not negate the sentence radical but rather introduces a negative alternative ('or not'). In form (4), however, we see a different function of headshake, previously unnoticed to our knowledge. Here, headshake does not express negation at all but rather functions as (part of) a question marker. In this use it occurs sentence-finally, typically in combination with the manual signs PALM-UP or HESITATE or a held sentence-final sign. Form (5) also features this inquisitive use of headshake, this time in combination with a headshake that signals negation of the sentence radical.

Distributional constraints. The observed distribution of the various forms across conditions suggests the following generalizations: (i) Questions involving a negative sentence radical with inquisitive headshake or other inquisitive NMM, (1) and (5), require negative CE or SB, and are incompatible with positive CE; (ii) Questions with a negative sentence radical and RIGHT (2) require negative SB; (iii) Questions with 'or not' (3) require neutral CE; and (iv) Questions with an inquisitive headshake, (4) and (5), require that the CE does not contradict the sentence radical, which means that if the sentence radical is positive, CE cannot be −, while if the sentence radical is negative, CE cannot be +.

Selected clickable references. Cañas Peña (2019). The marking of polar interrogatives [...] Domaneschi et al. (2017). Bias in polar questions [...] De Vos et al. (2009). [...] Questions in NGT.