Force shift: A case study of Cantonese *ho2* particle clusters

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Abstract

This paper investigates force shift, a phenomenon in which the canonical discourse conventions, or force, associated with a clause type can be overridden to yield polar questions with the help of additional force-indicating devices. Previous studies attribute force shift to the presence of a complex question force component operating on semantic content. Based on utterance particles and particle clusters in Cantonese, we analyze force shift as resulting from compositional operations on force-bearing expressions. We propose that a simplex force, such as assertion or question, denotes unanchored sentence acts, while a force-shifting particle like Cantonese *ho2* is an anchoring function anchoring a sentence act A to the speaker while querying whether or not the addressee can perform the sentence act A. The proposed semantics makes predictions about *ho2*'s interactions with addressee-changing operations and imperatives, as well as about a larger family of force shift phenomena.

Keywords force shift · illocutionary force · sentence acts · utterance particles · discourse dynamics · Cantonese

1 Introduction

Ever since Austin (1962) and Grice (1975), it is widely recognized that utterances convey a rich repertoire of communicative intentions, commonly known as illocutionary force. It is generally assumed that the inventory of illocutionary force types is quite large and can be roughly estimated based on the inventory of illocutionary verbs to include force types like declarations, assertions, reminders, requests, wishes, insults, etc (Austin 1962; Ross 1967; Searle 1969; Searle & Vanderveken 1985). There is no consensus on the exact procedure for deriving the illocutionary force of an utterance but it is generally assumed that it involves both domain-specific linguistic computations and possibly domain-general pragmatic computations (Searle & Vanderveken 1985; Lauer 2013; Chierchia & McConnell-Ginet 2000; Murray & Starr 2021). How these two types of computations work together is an on-going subject of research in linguistics and related disciplines.

The fact that linguistic material at least partly determine the illocutionary force of an utterance has led to a methodological innovation in linguistics—the identification of two force components, one semantic in nature and the other pragmatic. The former is known as *sentential force* while the latter is referred to as utterance force or illocutionary force (Chierchia & McConnell-Ginet

2000; Murray 2010; Portner 2018; Murray & Starr 2021). Since the term illocutionary force is sometimes used to refer to sentential force and other times to utterance force in the literature, we advocate here to use it as a umbrella term for sentential and utterance force, when the distinction of the two is unimportant or impossible.

Sentential force is determined by sentence typing devices, or force-indicating devices, such as word order (Truckenbrodt 2006), subject omission (Portner 2007), illocutionary mood markers (Murray 2010; Murray & Starr 2021), final intonational contours (Gunlogson 2001), or utterance particles (Law 1990; Cheng & Demirdache 1991; Davis 2009, 2011). Once a propositional content gets assigned a sentential force, it carries conventional discourse effects, which determine how a discourse may develop. For example, the declarative force requires that the speaker is committed to the relevant propositional content, the interrogative force invites someone, typically the addressee, to answer the question, and the imperative force requests that the addressee perform some action. Utterance force, on the other hand, is not determined by any sentence-level devices. It is best understood as reasoning procedures that are not compositional in nature, such as reasoning procedures advanced in Grice (1975), Lauer (2013), and Rudin (2022). An example illustrating the role of utterance force is that a question sentence act (in terms of sentential force) like *Can you pass me the salt?* can be used as a request (in terms of utterance force) in many contexts (Beyssade & Marandin 2006).

In the literature, both sentential-force bearing units and utterance-force bearing units are modeled as context changing functions, also known as context change potentials (e.g., Gunlogson 2001; Farkas & Bruce 2010; Davis 2009, 2011; Lauer 2013; Krifka 2015; Bhadra 2020; Murray & Starr 2021; see also Kamp 1981; Heim 1983; Groenendijk & Stokhof 1991). To distinguish context change potentials bearing sentential force from context change potentials bearing utterance force, we call the former, which is also the main subject of research in this paper—*sentence acts*. We have much less to say about the latter but when we do, we refer to them as *speech acts*. The terminology used in this dual-force model is provided in Table 1 and the structural representation of the two layers of force is given in Figure 1.

Force	Input	Output
sentential force	propositional content	sentence act (context change potential)
utterance force	sentence act	speech act (context change potential)

Table 1: Terminology in the dual force model

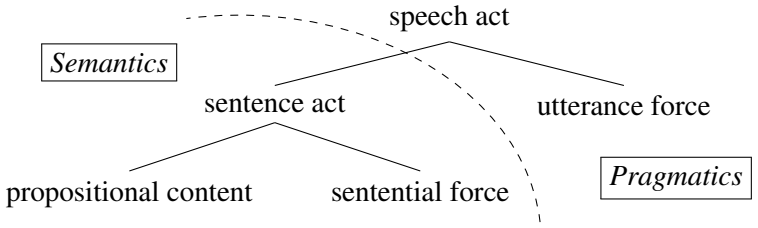

Figure 1: A dual force model

This dual-force model makes possible a principled division of labor between semantics and pragmatics. Since sentential force is semantic in nature, it is expected, and has been so argued, to exhibit linguistic compositionality (Gunlogson 2001, 2008; Krifka 2014, 2015; Bhadra 2017, 2020; Murray & Starr 2021). More concretely, sentential force is argued to have nontrivial internal structure and complex sentential force may be formed semantically by combining multiple force-level expressions. On the other hand, since utterance force is pragmatic in nature, it is not expected to exhibit compositionality but should follow broad reasoning procedures, such as those proposed in Grice (1975), Sperber & Wilson (1986) and related studies. The interplay of these two force components determine the overall force of an utterance.

This article seeks a better understanding of the phenomenon of *force shift* in light of the dual-force model. Force shift involves shifting from one force type to another force type with the help of identifiable force-indicating devices.[1] A well-known example of force shift is a rising declarative in English. As shown in (1), a rising declarative has a declarative sentence type, manifested by the lack of subject auxiliary inversion. However, instead of ending with a falling intonational contour characteristic of a statement like (2), a rising declarative typically ends with a rising intonational contour.

(1) You got a hair cut? Rising declarative

(2) You got a hair cut. Ordinary declarative

There is a consensus that the rising intonation shifts the assertive force canonically associated with a declarative to the question force. This is evident from the fact that a rising declarative like (1) requires an answer, like a polar interrogative (*Did you get a hair cut?*) but unlike the statement in (2). However, whether the shift happens semantically or pragmatically is a point of contention.

According to one approach, the shift happens semantically, at the level of *sentential force*. More specifically, the shift is the result of an assertive operator being replaced by a question operator. While a declarative with falling intonation involves an assertive operator in sentential force, a declarative with rising intonation involves a question operator in sentential force, as sketched in Figure 2. The question operator may also bear an additional evidential or bias component. Representative studies in this approach include Malamud & Stephenson (2015), Farkas & Roelofsen (2017), Jeong (2018), and Goodhue (2021).

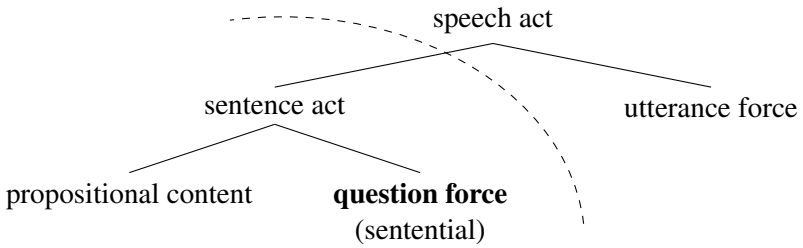

Figure 2: Force shift at the level of sentential force

Although this approach may be descriptively adequate, its major challenge comes from the fact

[1] This working definition exclude indirect speech acts, such as rhetorical questions (e.g., *Is the Pope Catholic?*) and questions taken to be commands (e.g., *Can you pass the salt?*).

that sentence type and intonation are two distinct force-level building blocks that exhibit compositionality. Not only can the declarative sentence type combine with either the falling intonation or the rising intonation to yield distinct discourse effects, the imperative sentence type also exhibits the same compatibility with these intonational contours (Portner 2018; Rudin 2018). By lumping together sentence type and intonation in a single sentential force operator, this semantic approach fails to capture the compositionality at the sentential force level.

Surprisingly, studies that pursue a compositional treatment of sentence type and intonation, like Gunlogson (2001) and Rudin (2022) and to some extent also Westera (2013), have opted to derive the question force pragmatically, at the level of *utterance force*. At the level of sentential force, the declarative sentence type contributes a force ingredient for building the assertive force. The contribution of the rising intonation is to modify the assertive force by weakening it or rendering it ineffective, leading to a defective assertive force. The modified assertive force then triggers a pragmatic reasoning procedure that yields the question force at the utterance force level, as sketched in Figure 3. Representative studies in this approach are Gunlogson (2003, 2008), Westera (2013), and Rudin (2022).

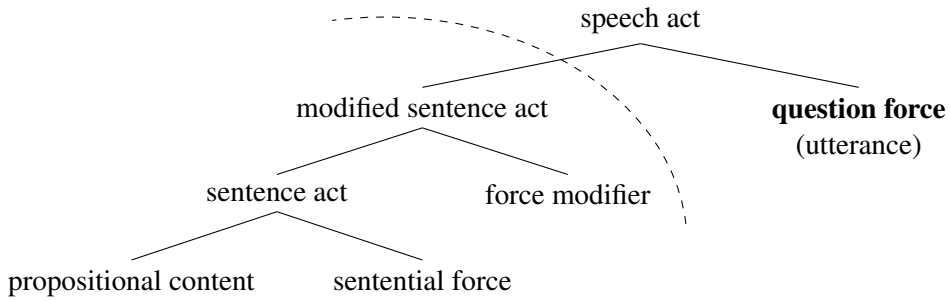

Figure 3: Force shift at the level of utterance force

Although the pragmatic approach allows compositionality at the sentential force level, it suffers from two drawbacks. First, it is very difficult to pin down the pragmatic procedure that can turn a modified assertion into a question. In fact, as far as we know, even studies advocating a pragmatic approach have not developed an explicit pragmatics for deriving the question force. For example, the pragmatic procedure developed by Gunlogson (2008) and Rudin (2022) primarily tackles the bias found in English rising declaratives. The Gricean approach advocated by Westera (2013), as far as we can tell, has no way of guaranteeing that rising declaratives are questions. Second, it is not clear that we should let pragmatics handle force shift with explicit force-indicating devices, given that they so reliably yield questions.

It looks like we are faced with a tension. A semantic approach has difficulty capturing the compositional nature of force shift, while a pragmatic approach has difficulty delivering the very question force. The reason why this tension arises in the first place is because it is not clear how a force type can be shifted to another in a compositional manner. This paper resolves this tension by contributing a novel semantic approach to force shift. Like the existing semantic approach and unlike the pragmatic approach, we derive the question force at the level of sentential force. However, instead of using a single unanalyzed sentential force operator to derive force shift, we make use of the internal structure of sentential force, as exploited in the pragmatic approach. We

argue that it is precisely the availability of the internal structure that allows force shift to arise as a semantic operation.

This novel semantic approach is motivated by force shift in Cantonese involving sentence-final utterance particles. We will extend the approach to rising declaratives in English in section 4.4 but the majority of this article concerns force shift involving utterance particles in Cantonese. Particle-induced force shift in Cantonese proves to be particularly relevant for two reasons.

First, this type of force shift involves stacking of final utterance particles that strongly calls for a compositional analysis of sentential force. To wit, simplex particles like *gaa3* and *ne1* are used to mark a declarative with an assertive force in (3) and an *wh*-interrogative with a question force in (4), respectively.[2]

(3) Zi3ming4 sik6 haa1 **gaa3**.
Ziming eat shrimp ASRT
'Ziming eats shrimp.'

(4) Bin1go3 sik6 haa1 **ne1**?
who eat shrimp WHQ
'Who eats shrimp?'

These simplex particles may form complex particle clusters with another particle *ho2*, as exemplified by (5) and (6). The presence of *ho2* turns the assertion and the *wh*-question to polar questions (see also Lam 2014; Tang 2015, 2020; Law et al. 2018).[3]

(5) Zi3ming4 sik6 haa1 **gaa3 ho2**?
Ziming eat shrimp ASRT HO
Roughly: 'Ziming eats shrimp. Right?' assertion to polar question

(6) Bin1go3 sik6 haa1 **ne1 ho2**?
who eat shrimp WHQ HO
'Who eats shrimp? Do you also wonder?' *wh*-question to polar question

Whether the question force is derived semantically or pragmatically, particle clusters like these at the very least call for a sentential force component that has nontrivial hierarchical structure.

Second, as suggested by the rough translations in (5) and (6) and will be argued more extensively in section 2, particle force shift requires no defective sentential force. The assertive force associated with the declarative particle *gaa3* is preserved in (5), and so is the question force associated with the interrogative particle *ne1* in (6). This is a strong argument against deriving the question force as a way to pragmatically cope with a defective sentential force component.

We summarize our main claims about force shift in Cantonese and beyond as follows. Like

[2] All Cantonese sentences in this paper are given in Jyutping, a romanization system developed by the Linguistic Society of Hong Kong. Particles under investigation are set in boldface and are glossed using force/act-level terminology (like *assertion* and *question*) rather than sentence-type terminology (like *declarative* and *interrogative*) because there are many more particles in Cantonese than sentence types traditionally recognized in the literature. The convention used for glosses is as follows: ASP = aspect marker, ASRT = assertive particle; BPQ = polar question with a negative bias, POLQ = polar question particle, UP = utterance particle, WHQ = *wh*-question particle.

[3] A reviewer points out that a brief pause is allowed, but not required, between *ho2* and a preceding particle. Similar observations are also made in Tang (2020). There are a few possible reasons for the optional pause. First, it may be due to the fact that *ho2* begins with a glottal consonant, which does not have any constriction in the oral cavity. If *ho2* is said quickly, the consonant [h] is very weak. The lower particle and *ho2* will almost sound like one particle. If one wants to clearly indicate that there are two particles, then it is natural to insert a pause before *ho2*, much like inserting a glottal stop between two vowels. Second, the pause may also be semantically/pragmatically motivated. As is argued later in this paper, *ho2* anchors a sentence act to both the speaker and the addressee, which is more complex than simple anchoring. The optional pause may be used to draw the hearer's attention to this complexity.

Gunlogson (2001) and Rudin (2018, 2022), we assume that sentential force is hierarchically organized, as shown in Figure 4. Lower force-indicating devices like sentence types in English, or particles like *gaa3* and *ne1* in Cantonese, map a propositional content to an *unanchored* sentence act. For concreteness, an unanchored assertion and an unanchored *wh*-question are functions from discourse participants to context change potentials (Gunlogson 2001; Davis 2011; Rudin 2022). They are defined in (7) and (8), both semi-formally.

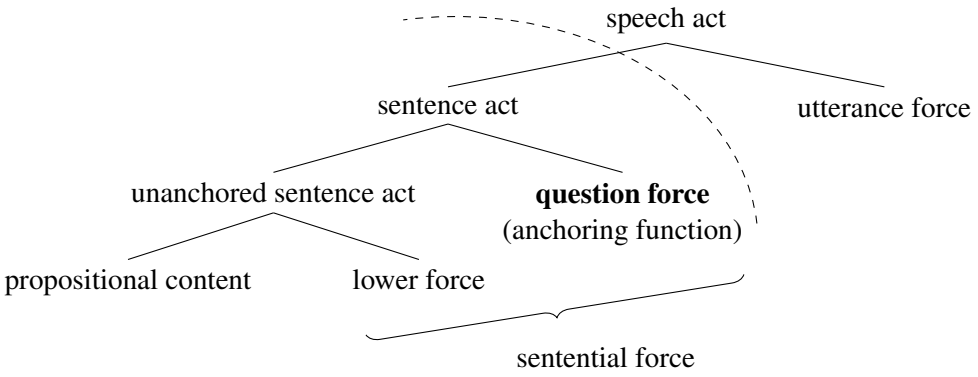

Figure 4: Sentential question force via anchoring

(7) Unanchored assertion (*S-gaa3*): $\lambda x.\ x$ asserts S

(8) Unanchored question (*S-ne1*): $\lambda x.\ x$ asks S

However, instead of positing a pragmatic mechanism for deriving force shift, we derive force shift semantically, based on two essential assumptions.

First, we argue that there is a natural link in force shift to polar questions and the nature of sentence acts. Conventionally, a polar question partitions an input context into two parts—one part verifies the propositional content and the other falsifies it. Similarly, a sentence act can be *defined* or *undefined* for an input context (Austin 1962; Searle 1969; Searle & Vanderveken 1985; MacFarlane 2005, 2011; Condoravdi & Lauer 2012; Lauer 2013, a.o.). So, a polar question can be formed based on a sentence act, partitioning an input context into two parts—one part is defined for the sentence act and the other undefined. In fact, we argue that a force shift operator like *ho2* is precisely such a polar question operator—it compositionally builds polar questions out of sentence acts.

Second, we argue for an understanding of polar question operators operating on sentence acts in terms of anchoring functions. These anchoring functions map an unanchored sentence act to a full-fledged, anchored sentence act, essentially by determining who may serve as the anchor of a sentence act and how. For concreteness, the anchoring function contributed by *ho2* is informally defined in (9). It maps an unanchored sentence act A of any force to two sentence acts, the act of performing A by the speaker, and the act of asking whether or not A can be performed by the addressee.

(9) λA. Spkr performs A; can Addr perform A or not?

In our formal definition (see section 3.3), an anchoring function is a quantifier over discourse participants scoping over unanchored sentence acts, which are essentially (sentence act) predicates

of participants. It is worth noting that the space for anchoring functions is quite large. What we do in this paper is defend a particular anchoring function based on the empirical properties of particle clusters involving *ho2*. We briefly discuss, in section 4.4, what other anchoring functions are available in natural language that show slightly different force shift properties.

The remainder of this article is organized as follows: Section 2 introduces the reader to final utterance particles in Cantonese that may form a cluster with the particle *ho2* as well as their distributional and interpretive properties. Section 3 lays out the formal framework of sentence act anchoring and extends it to simplex particles and *ho2* particle clusters in Cantonese. Section 4 shows that the analysis can be extended to explain a wider range of particles clusters as well as the role of context. Section 5 concludes.

2 The empirical landscape

In this section, we first introduce simplex final utterance particles in Cantonese that mark assertions and questions. Then, we introduce particle clusters involving simplex particles and the particle *ho2*, focusing on their interpretations and contexts of use. The upshot of the empirical discussion is two fold—the particle clusters are not only compositional in nature, they also suggest the possibility of operations on force-bearing expressions.

All the Cantonese data reported in this paper come from Hong Kong Cantonese, the Cantonese variety spoken in Hong Kong.[4] The acceptability judgement reported for each sentence comes from one of the authors, who is a native speaker of Hong Kong Cantonese, and has been cross-checked with four other Cantonese speakers.[5] When verifying data relative to contexts, the contexts were presented in colloquial Cantonese and translated into English in this paper. Please refer to section 2 of the supplemental file for the original contexts in Cantonese along with glosses.

Besides native speakers' judgments, the acceptability of particles and particle clusters discussed in this paper is supported by the literature and by a corpus search. Simplex particles discussed in this section, including *gaa3*, *ge3*, *aa3*, *ne1/le1*, *me1* and their functions can be found in Matthews & Yip (1994, 2011), Fang (2003), and Sybesma & Li (2007). Clusters like *gaa3-ho2*, *me1-ho2* and *ne1/le1-ho2* and their contextual requirements reported in this paper are also independently observed in Lam (2014). We also searched the Hong Kong Cantonese Corpus (Luke & Wong 2015) and found the following clusters involving *ho2* (included in parentheses are the frequencies): *aa3-ho2* (3), *gaa-wo3-ho2* (1), *laa3-ho2* (1), *lo1-ho2* (1), *wo3-ho2* (1). We take this to indicate that particle clusters involving *ho2* are productive in Cantonese.

[4] There are other varieties of Cantonese spoken in other regions with slightly different inventories of utterance particles and their clusters. We reserve potential dialectal variations for future research.

[5] The four speakers all grew up and lived in Hong Kong and were aged between 28 and 40 at the time of data collection, between 2018 and 2019. They were friends and relatives of the first author and were recruited through her personal network. Their participation was voluntary and not compensated. The judgements were collected in separate elicitation sessions, each with the first author as the interviewer and one of the informants as the interviewee. In each session, the interviewer presented the contexts and target sentences, group by group, in written Cantonese and spoken Cantonese. She then asked the interviewee to offer a felicity judgment for the target sentences in each group. A sentences was reported as 'grammatical', 'marginal' (prefixed with '?'), or 'ungrammatical' (prefixed with '*') if there was consensus from more than half of the five involved parties. A sentence was reported as 'infelicitous' (prefixed with '#') if it was judged as infelicitous in the given context but otherwise grammatical.

2.1 Simplex final utterance particles in Cantonese

Broadly speaking, Cantonese distinguishes among at least three types of sentences: declaratives, interrogatives and imperatives. These clauses are often (but not always) marked by a particle occurring at the end of a sentence, sometimes known as a final utterance particle. Despite their optionality, native speakers strongly prefer the use of these particles in naturalistic speech and especially conversations (Law 1990; Luke 1990; Fung 2000, a.o.). For this reason, these particles are also called 'utterance particles' or 'discourse particles'. Like many other clause-typing devices, these particles occur in main clauses and are generally not allowed in subordinate clauses (Tang 1998; Law 2002).

The particle *gaa3* marks a declarative clause to give rise to an assertive force. *Gaa3* is also mainly used with stative predicates, as exemplified in (10). Please refer to section 1 of the supplemental file for a more detailed documentation of this observation. The particle *aa3* has no aspectual restriction, as shown in (10) and (11).[6] It is compatible with a range of clause types, including but not limited to declarative clauses. We will leave the precise semantics of *aa3* open in this paper, but we do argue, in section 4.2, that it indicates an addressee-directed speech act and have non-trivial interactions with *ho2*. Based on this argument and previous research suggesting that *aa3* alerts the addressee, we gloss *aa3* as an alertive (ALRT) in this paper.

(10) Zi3ming4 sik6 haa1 (**gaa3/aa3**).
Ziming eat shrimp ASRT/ALRT
'Ziming eats shrimp.'

(11) Zi3ming4 heoi5-zo2 hok6haau6 (**aa3**).
Ziming go-ASP school ALRT
'Ziming went to school.'

We do not go into the differences among these two particles in this study as they pattern alike in forming particle clusters with *ho2*. *Aa3* may also be used in various types of questions as well as in imperatives and exclamatives, a distribution we return to below and in section 4.2.

Questions are marked by a range of final utterance particles depending on the type of question involved. To mark a *wh*-question, an alternative question, or a so-called A-not-A question, the particle *ne1* or *aa3* may be used, as shown in (12) - (14) (Matthews & Yip 1994; Fang 2003; Sybesma & Li 2007).[7]

(12) Bin1go3 sik6 haa1 (**ne1/aa3**)?
who eat shrimp WHQ/ALRT
'Who eats shrimp?' *Wh*-question

(13) Zi3ming4 sik6 haa1 ding6 sik6 jyu4 (**ne1/aa3**)?
Ziming eat shrimp or eat fish WHQ/ALRT
'Does Ziming eat shrimp or fish?' Alternative question

[6] It is unclear to us why *gaa3* and *aa3* differ in their compatibility with aspectual classes. Since both particles can form particle clusters with *ho2*, we assume that their aspectual selection properties do not interact with force shift. Another particle closely related to *gaa3* is *ge3*, which is also regarded as a declarative particle. It is often conjectured that *gaa3* is itself a cluster involving *ge3* and *aa3*. However, unlike *gaa3-ho2*, which is accepted by all informants we have consulted, a reviewer pointed out that some speakers find *ge3-ho2* degraded. We searched Hong Kong Cantonese Corpus, credited to Luke & Wong (2015), and confirmed that the cluster *ge3-ho2* is indeed non-existent. However, the cluster is reported to be acceptable in Matthews & Yip (2011). We acknowledge the inter-speaker variation but leave it open in this paper.

[7] Some have expressed doubts towards treating *ne1* as a question marker. For example, Law (1990) analyzes it as a marker of tentativeness.

(14) Zi3ming4 sik6-m4-sik6 haa1 (**ne1/aa3**)?
who eat shrimp WHQ/ALRT
'Does Ziming eat shrimp or not?' A-not-A question

Wh-questions and alternative questions are found in most, if not all, languages and are believed to be similar to each other in terms of their semantics (Kratzer & Shimoyama 2002; Shimoyama 2006; Beck 2006; Nicolae 2014). A-not-A questions are roughly considered a hybrid of alternative and polar questions (Hara 2014). Since they share the same particles in Cantonese, we treat them as a natural class in this paper.

There are subtle differences between *ne1*-questions and *aa3*-questions in Cantonese. In particular, *ne1* patterns like its Mandarin correlate *ne* in being compatible with self-directed questions in trains of thought (see Guo 2009). *Aa3*-questions, on the other hand, are used when an addressee response is expected. This distinction is later shown to determine whether or not a question particle can form a cluster with *ho2* (see section 4.2).

Polar questions may also be marked by *maa3* and *me1*, as shown in (15) and (16). According to Sybesma & Li (2007) and Chor & Lam (2023), while *maa3* marks a neutral polar question, *me1* marks a polar question with a bias opposite to the polarity of the prejacent proposition (i.e., the proposition corresponding to the question nucleus minus the question particle).[8] Both *maa3* and *me1* are obligatory for a question interpretation–omitting them yields either a falling declarative or a polar question akin to a rising declarative in English.[9]

Ordinary polar question

(15) Nei5 jau5 si4gaan3 **maa3**?
you have time POLQ
'Do you have time?'

Polar question with a bias

(16) Nei5 jau5 si4gaan3 **me1**?
you have time BPQ
'Do you really have time? (I think not.)'

Final utterance particles in Cantonese have been analyzed as functional heads of ForceP, which roughly correspond to sentence acts in this paper (Law 2002; Lam 2014; Tang 2015, 2020). However, the relationship between final particles and force is not a clean one-to-one correspondence (Luke 1990; Fung 2000; Sybesma & Li 2007; Lau 2019), much like the imperfect relationship between other clause-typing devices and force. Different final particles may be used to indicate the same force category (e.g. *maa3, ne1* and *aa3* all mark questions), possibly with slightly different flavors, while the same final particle may be compatible with different force categories (e.g. *aa3* can be used in assertions, questions, and imperatives, as described in Lau 2019). It is possible that these particles are not lexical realizations of the force category, but rather stand in relation to force as a more abstract category.[10]

Many of the simplex particles may form particle clusters with a variety of other final particles (Law 1990; Matthews & Yip 1994; Lam 2014; Tang 2015; Law et al. 2018). While some of these

[8] A reviewer suggests that *maa3* is less common in Hong Kong Cantonese than Guangzhou Cantonese. Sybesma & Li (2007) speculate that *maa3* may be borrowed from Mandarin.

[9] *Maa3* and *me1* are the primary polar question particles in Cantonese. The general purpose particle *aa3* can also be used to mark polar questions and will be discussed in section 4.2.

[10] What is not possible, we think, is an analysis in which simplex particles are treated as content-level complementizers, such as treating *ne1* as an interrogative complementizer, à la Karttunen (1977), that turns a proposition into a set of propositions. Our refutation of this analysis is based on the observation that these particles resist embedding environments.

clusters preserve the force type, others trigger force shift. Since the central concern of this paper is force shift, we only take up particle clusters involving *ho2*, which invariably exhibit force shift, in the next three subsections.

2.2 ASSERT-HO clusters

It has been observed that simplex particles may form particle clusters with *ho2* (Lam 2014). In this subsection, we take up particle clusters involving *ho2* and an assertive particle, focusing on their similarities to and differences from simple declaratives, simple polar questions, and rising declaratives in Cantonese. For simplicity, we have chosen the declarative particle *gaa3* to represent all declarative particles.

As shown in (17)A, *gaa3* may form a particle cluster with *ho2*. Such a particle cluster marks a polar question. This is evidenced by the felicity of the affirmative and negative responses in (17)B-i and (17)B-ii, as well as the infelicity of a response like (17)B-iii signaling the addressee B's acceptance of the proposition based on the speaker A's assertion. This kind of acceptance is sometimes known as a dependent commitment (Gunlogson 2008; Krifka to appear). The (in)felicity of a dependent commitment as a response sets apart a *gaa3-ho2*-cluster and *gaa3*. This is because the latter, shown in (18)A, not only admits an affirmative or a negative response, as shown in (18)B-i and (18)B-ii, but also a dependent commitment, as shown in (18)B-iii.

(17) A: Zi3ming4 sik6 haa1 **gaa3 ho2**?
Ziming eat shrimp ASRT HO
'Ziming eats shrimp. Right?'

B: (i) Hai aa3.
yes ASRT
'Yes.'

(ii) M4hai6 aa3.
no ASRT
'No.'

(iii) #Okay. Ngo5 zi1dou3 laa3.
okay I know already
'Okay. I now know this'

(18) A: Zi3ming4 sik6 haa1 **gaa3**.
Ziming eat shrimp ASRT
'Ziming eats shrimp.'

B: (i) Hai6 aa3.
yes ASRT
'Yes.'

(ii) M4hai6 aa3.
no ASRT
'No.'

(iii) Okay. Ngo5 zi1dou6 laa3.
okay I know already
'Okay. I now know this'

We argue that the difference in the (in)felicity of a dependent commitment should be understood

as a contrast in the force status of *gaa3* and *gaa3-ho2*. More specifically, while the former yields an assertion, the latter yields a polar question.

In addition, a polar question involving a *gaa3-ho2*-cluster carries a strong bias (which we later argue to be a commitment) towards the prejacent proposition, namely, that Ziming eats shrimp (Lam 2014). The presence of this strong bias component requires that the context admitting a *gaa3-ho*-question also carries a speaker bias towards the prejacent proposition. An example of such a context is given in (19).

(19) **Biased context**
Ziming was meeting his friends Annie and Bob for dinner at a seafood restaurant. He was running late and asked his friends to help him make an order without specifying what he wanted. Annie remembered that Ziming ate shrimp but wanted to confirm it.

(20) A: Zi3ming4 sik6 haa1 **gaa3 ho2**?
Ziming eat shrimp ASRT HO
'Ziming eats shrimp. Right?'
B: (i) Hai6 aa3.
yes ALRT
'Yes.'
(ii) M4hai6 aa3.
no ALRT
'No.'

Following Lam (2014), we argue that a polar question with a *gaa3-ho2* cluster introduces a complex sentence act. The complex sentence act is derived not by letting *gaa3* and *ho2* form a complex force jointly operating on the semantic content of a proposition. Rather, it is derived by *ho2* operating on a force-bearing expression, as shown in Figure 5. The force-bearing expression, in this case, is an assertion predicate of discourse participants, generated by combining a proposition with the declarative particle *gaa3*.

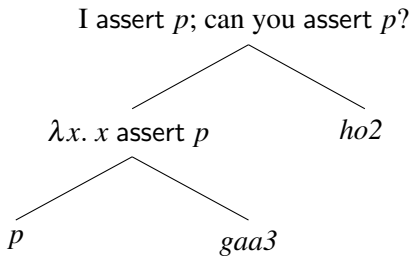

Figure 5: Anchoring an assertion

Ho2 provides two discourse participants as anchors for the assertion predicate. The anchoring yields a sentence act with two components. The first part is basically a simple assertion by the speaker. The second part is a polar question querying whether or not the assertive act *can* be performed by the addressee. The addressee-oriented part has an additional modal component, which we roughly approximate to the meaning of *can* throughout this paper. We need this component to distinguish between actual performance of an act and the definedness of an act relative to an

input context. The latter is what gives rise to the modal-like flavor. Such an analysis makes a few predictions.

To begin with, if *ho2* indeed operates on a force-bearing expression, the most straightforward prediction is that it should have a distribution distinct from simpler polar question particles operating on content. This prediction is borne out, by a comparison of the distribution of *ho2* and the polar question particle *maa3*. Concretely, while *ho2* may form a particle cluster with a declarative particle, as we have witnessed in (20), *maa3* may not form such a cluster, as shown below:

(21) Zi3ming4 sik6 haa1 (*ge3/*gaa3/*aa3) **maa3**?
Ziming eat shrimp ASRT/ASRT/ALRT POLQ
'Does Ziming eat shrimp?'

The speaker-oriented assertive component makes a series of predictions. First, since a *gaa3-ho2* cluster requires that the assertive act must be performable by the speaker, it predicts that the speaker has a strong bias towards the proposition. This in turn predicts that the speaker cannot use a *gaa3-ho2* cluster with a proposition they do not believe, unless they intend to conceal their genuine private belief. For example, in the context in (22), the speaker Ziming believed that 3+3 does not equal 7. For this reason, he could not use the *gaa3-ho2* polar question in (23-a) to challenge his son's answer. This contrasts with a rising declarative like (23-b), which is known to have a much weaker speaker bias and is acceptable in the same context (see also Ward & Hirschberg 1985; Gunlogson 2008; Poschmann 2008; Lauer & Condoravdi 2012; Westera 2013; Northrup 2014; Malamud & Stephenson 2015; Krifka 2017; Farkas & Roelofsen 2017; Bhadra 2020).

(22) **Context: Opposite bias**
Ziming was checking his son's math homework and saw that his son incorrectly wrote 3+3 =7. To flag this problem, he asked (23-a).[11]

(23) a. #Saam1 gaa1 saam1 dang2jyu1 cat1 **gaa3 ho2**?
3 plus 3 equal 7 ASRT HO
'Three plus three equals seven. Right?' *gaa3-ho2* question

b. Saam1 gaa1 saam1 dang2jyu1 cat1 (**gaa4**)?
3 plus 3 equal 7 ASRT
'Three plus three equals seven?' rising declarative

Second, the performability of the assertive act by the speaker also predicts that after the performance of a *gaa3-ho2* polar question, the speaker cannot cancel the discourse commitment associated with the declarative particle *gaa3*. This is borne out by the unacceptable continuation in (24). Again, the stability of the discourse commitment stands in stark contrast with the weak speaker bias of an rising declarative, which is compatible with the same continuation, as shown in (25).

(24) Zi3ming4 sik6 haa1 **gaa3 ho2**? #Ngo5 m4-gok3dak1 lo1.
Ziming eat shrimp ASRT HO I not-think UP
'Ziming eats shrimp. Right? I don't think so.'

[11] This question can be felicitous if Ziming tried to be sarcastic and pretend that he is committed to the incorrect answer. This does not challenge the generalization that *gaa3-ho2* preserves speaker commitment. Rather, it shows that the assertive force associated with *gaa3-ho2* is very similar to the assertive force of ordinary assertions in the sense that both can give rise to sarcasm.

(25) Zi3ming4 sik6 haa1 (**gaa4**)? Ngo5 m4-gok3dak1 lo1.
Ziming eat shrimp ASRT I not-think UP
'Ziming eats shrimp? I don't think so.'

Third, the proposed analysis also predicts that in a neutral context without a speaker bias, as given in (26), a simple polar question like (27-b) is preferred to a *gaa3-ho2* polar question like (27-a), with the same propositional content.

(26) **Neutral context**
Context: Ziming was meeting his friends Annie and Bob for dinner at a seafood restaurant. Since he was running late, he asked his friends to help him make an order without specifying what he wanted. Annie was not sure whether Ziming ate shrimp or not. So, she asked:

(27) a. #Zi3ming4 sik6 haa1 **gaa3 ho2**?
Ziming eat shrimp ASRT HO
'Does Ziming eat shrimp?'
b. Zi3ming4 sik6 haa1 **maa3**?
Ziming eat shrimp POLQ
'Does Ziming eat shrimp?'

We acknowledge that these arguments only show that the 'bias' associated with a *gaa3-ho2* cluster is more robust than a polar question or a rising declarative, but not enough to show that it is a discourse commitment. We relate this shortcoming to the general difficulty in reliably distinguishing between biases and commitments. In some studies, for example, Northrup (2014) and Farkas & Roelofsen (2017), biases and commitments are analyzed using the same gradient evidential component, which makes it unnecessary to distinguish between the two notions.

Besides the predictions discussed above, the anchoring analysis also predicts that the complex sentence act resulting from anchoring a force-bearing expression changes depending on the force involved. In the next subsection, we investigate two types of question particles that may form particle clusters with *ho2* to form particles clusters. It is shown that the interpretive properties of these clusters follow from the anchoring analysis. Imperatives are also compatible with *ho2*, with some caveat. They are deferred until section 4.2, along with polar questions and a special class of *wh*-questions.

2.3 QUESTION-HO clusters

2.3.1 *Me1-ho2*: questioning bias

To begin with, recall that *me1* is a polar question particle with a speaker bias towards the opposite bias of the prejacent proposition. For example, consider the *me1*-polar question in (28-a). When *ho2* is added to a *me1*-question, as in (28-b), a new polar question is formed.

(28) a. Zi3ming4 sik6 haa1 **me1**?
Ziming eat shrimp BPQ
'Does Ziming really eat shrimp?'
b. Zi3ming4 sik6 haa1 **me1 ho2**?
Ziming eat shrimp BPQ HO

'Does Ziming really eat shrimp? Do you also wonder?'

According to the anchoring analysis, it is predicted that (28-b) is not a simple polar question about content. Rather, it is a polar question about force, or more precisely, a polar question about a force-bearing expression. Deferring a detailed analysis to section 2.3.2, we suggest here that the interpretation of such a force-level polar question is as follows:

(29) Complex sentence act of a *me1-ho2* polar question
   a. Speaker-oriented: The speaker asks a *me1*-question.
   b. Addressee-oriented: Can the addressee ask a *me1*-question?

Again, the additional modal 'can' in the addressee-oriented component indicates that this component is about the performability (or definedness) of the question act against an input context. This analysis predicts that unlike a *gaa3-ho2* cluster, a *me1-ho2* cluster does not encode speaker commitment towards the the prejacent proposition. This prediction is borne out by the fact that a *me1-ho2* question like (31-a) is acceptable in a context, like (30), in which the speaker has the bias towards the opposite polarity of the prejacent proposition. The same context fails to support a *gaa3-ho2* polar question, as shown in (31-b).

(30) **Context: confirming a bias**
Ada told Bob and Cindy that Ziming eats shrimp, but Bob remembered otherwise. Bob believed that Cindy may share his belief, so he asked Cindy:

(31) a. Zi3ming4 sik6 haa1 **me1 ho2**?
   Ziming eat shrimp BPQ HO
   'Does Ziming really eat shrimp? Do you also wonder?'
   b. #Zi3ming4 sik6 haa1 **gaa3 ho2**?
   Ziming eat shrimp ASRT **ho**
   'Ziming eats shrimp. Right?'

The analysis also predicts that as a polar question, a *me1-ho2*-question should be answerable by a positive and negative answer. More precisely, given that it is a polar question about force, rather than a polar question about content, we should expect a positive answer to indicate an agreement with the biased question or with the bias. This is indeed the case, as illustrated in (33-a), in which the positive particle *hai* roughly corresponds to *yes* or *right* in English. A negative answer is also possible, though it does not merely indicate that a *me1*-question is unperformable, but also that the addressee holds the opposite belief, as shown in (33-b).

(32) Zi3ming4 sik6 haa1 **me1 ho2**?
Ziming eat shrimp BPQ HO
'Does Ziming really eat shrimp? Do you also wonder?'

(33) a. Hai6 lo1. Keoi5 sik6 haa1 me1? / Keoi5 ming4ming4 m4-sik6 haa1 gaa3.
   yes UP he eat shrimp BPQ / he as.remembered not-eat shrimp ASRT
   'Right. Does he really eat shrimp? / He doesn't eat shrimp, from what I remember.'
   b. M4-hai6 aa3. Keoi5 sik6 haa1 gaa3.
   not-yes UP he eat shrimp ASRT
   'No, he eats shrimp.'

The fact that a positive answer confirms the bias associated with *me1* and a negative answer does the opposite is due to the presence of *ho2*. When *ho2* is absent, a positive answer and a negative answer in (35-a) and (35-b) do just the opposite as a response to the *me1* polar question in (34).

(34) Zi3ming4 sik6 haa1 **me1**?
Ziming eat shrimp BPQ
'Does Ziming really eat shrimp?'

(35) a. Hai aa3. Keoi5 sik6 haa1 gaa3.
yes UP he eat shrimp ASRT
'Yes, he eats shrimp.'
b. M4-hai6 aa3. Keoi5 m4-sik6 haa1 gaa3.
not-yes UP he not-eat shrimp ASRT
'No, he doesn't eat shrimp.'

The interpretation of the answers is expected if a *me1*-question is a polar question about content: a positive answer confirms the prejacent proposition, while the negative answer confirms just the opposite. This contrasts with a *me1-ho2*-question: a positive answer confirms not the prejacent proposition, but the biased *me1*-question, and the negative answer confirms not the opposite of the prejacent proposition, but the opposite of the bias associated with *me1*.

2.3.2 *Wh*-questions with *ne1*

As briefly mentioned in section 2.1, Cantonese uses the particle *ne1* (and its variant *le1*) to mark A-not-A questions (ANAQs), alternative interrogatives, and *wh*-interrogatives. All of these interrogatives are compatible with *ho2*.[12]

(36) Zi3ming4 sik6-m4-sik6 haa1 **ne1** **ho2**?
Ziming eat-not-eat shrimp WHQ HO
'Does Ziming eat shrimp or not? Do you wonder?' ANAQ-*ho*

(37) Zi3ming4 sik6 haa1 ding6 sik6 jyu2 **ne1** **ho2**?
Ziming eat shrimp or eat fish WHQ HO
'Does Ziming eat shrimp or fish? Do you wonder?' ALTQ-*ho*

(38) Bin1go3 sik6 haa1 **ne1** **ho2**?
who eat shrimp WHQ HO
'Who eats shrimp? Do you wonder?' WHQ-*ho*

The well-formedness of these questions directly challenges a complex force analysis in which *ho2* operates on the semantic content. In particular, while the propositional content in a *gaa3*-assertion or a *me1*-question can arguably be turned into a polar question by *ho2*, it is much less straightforward how the *wh*-interrogative content in a *ne1*-question can be turned into a polar question.

By contrast, a *ne1-ho2* cluster is expected given the anchoring semantics of *ho2*. According to the anchoring analysis, a *ne1-ho2* cluster gives rise to a complex sentence act, namely, a polar question about the question force associated with *ne1*. This complex sentence act also has two

[12] *Maa3*-polar questions and *aa3*-questions are generally not acceptable with *ho2*. However, the acceptability can be remedied by a mechanism known as addressee shift, which we discuss in section 4.2.

parts, just like the ones associated with the *gaa3-ho2* and *me1-ho2* clusters, as summarized in (39).

(39) Complex sentence act of a *ne1-ho2* polar question
   a. Speaker-oriented: The speaker asks a *ne1*-question.
   b. Addressee-oriented: Can the addressee ask a *ne1*-question?

A *ne1*-question can be a *wh*-, alternative, or A-not-A question, so it carries neither a commitment, like *gaa3*, nor a bias, like *me1*. Instead, it carries the force of an ordinary question. Accordingly, the speaker-oriented component predicts that a *ne1-ho2* question can only be performed in a context in which the speaker may perform just the *ne1*-question. For example, in a context like (40), in which a speaker has just revealed the answer to a *ne1*-question, they can neither ask the *ne1*-question, as shown in (41-a), nor the corresponding *ne1-ho2*-question, as shown in (41-b).[13]

(40) **Context: Answer has been revealed**
Ada told Bob that Ziming was the only one at the department who went to a conference. Right after saying this, she asked Bob:

(41) a. #Bin1go3 heoi3-zo2 wui6ji5 **ne1**?
   who go-Asp conference WHQ
   'Who went to the conference?'
   b. #Bin1go3 heoi3-zo2 wui6ji5 **ne1 ho2** ?
   who go-Asp conference WHQ HO
   'Who went to the conference? Do you also wonder?'

If a *ne1-ho2*-question's speaker-oriented component is responsible for its similarity to a *ne1*-question, its addressee-oriented component sets it apart from the latter. More specifically, a *ne1*-question is a *wh*-question, while a *ne1-ho2* question is a polar question about the performability of a *wh*-question. Generally speaking, a speaker uses a neutral, information-seeking question to signal their ignorance and possibly also request an answer. The context in (42) is one that supports a default question marked by *ne1*. In such a context, adding *ho2* is generally not felicitous.[14]

(42) **Context: Only the speaker is confused**
A famous scientist gives a talk on astrophysics. Ada, as a layman, could not follow the talk. Ada's friend Beth is an astrophysicist, and it seemed to Ada that Beth understood the talk very well. Ada hence asks Beth:

(43) a. Keoi5 gong2 me1 **ne1**?
   he say what WHQ

[13] A reviewer suggested that questions operated by *ho2* may be related to conjectural questions. Conjectural questions, as defined in the literature (see Eckardt 2020 for an overview) have a very distinct profile. The asker of a conjectural question does not expect the addressee to know the answer and thus does not request an answer. Consequently, the addressee can remain silent without violating the rules of discourse. *Ho2*-questions, on the other hand, have an opposite effect on the discourse. They mandatorily require a response from the addressee, who is expected to know the answer and also respond. Another point of difference between conjectural questions and *ho2*-questions is that the former is anchored to the propositional content, while the latter is a higher level question not about a propositional content but about a sentence act.

[14] The use of a *ne1-ho2* question in this context would be felicitous if Ada was trying to get Beth to explain the content of the talk without admitting that she thought Beth was more knowledgeable than her, which would be a discourse effect of using a *ne1*-question.

'What did he say?'

b. #Keoi5 gong2 me1 **ne1 ho2**?
he say what WHQ HO
'What did he say? Do you also wonder?'

The infelicity of (43-b) is expected. The *ne1-ho2*-question asks Beth whether she can perform the *ne1* question act or not. In a normal context, such a performability question can be asked only when the speaker thinks it is an unsettled issue. For this reason, (43-b) is infelicitous because the speaker Ada believes that the addressee Beth knows the answer, and hence the lower *ne1*-question act is not performable by Beth.

On the contrary, in a context like (44), where the speaker suspects that the addressee also may not know the answer to a lower *ne1*-question, then a *ne1-ho2*-question can be felicitously used, as shown in (45-a). As expected, a *ne1*-question is dis-preferred.[15]

(44) **Context: Both the speaker and the addressee are confused**
A famous scientist gave a talk on astrophysics. Ada, as a layman, could not follow the talk. Ada's friend Beth is also a layman, and it seemed to Ada that Beth did not understand the talk either. Ada asks Beth:

(45) a. #Keoi5 gong2 me1 **ne1**?
he say what WHQ
'What did he say?'

b. Keoi5 gong2 me1 **ne1 ho2**?
he say what WHQ HO
'What did he say? Do you also wonder?'

The sentence act anchoring analysis also predicts that a *ne1-ho2*-question should differ from a *ne1*-question in terms of the answers it may receive. Observe that a *ne1*-question like (46) may receive, among other possibilities, a fragment response like (47-a) or an ignorance response like (47-b). Note that in the ignorance response, the use of the additive morpheme *dou1* is optional.

(46) Bin1go3 sik6 haa1 **ne1**?
who eat shrimp WHQ
'Who eats shrimp?'

(47) a. Zi3ming4 aa3.
Ziming ALRT
'Ziming.'

b. Ngo5 (dou1) m4zi1 aa3.
I also not.know ALRT
'I (also) don't know.'

Embedding a *ne1*-question under *ho2*, as in (48), leads to a change in the range of felicitous responses, as shown in (49).

(48) Bin1go3 sik6 haa1 **ne1 ho2**?
who eat shrimp WHQ HO

[15] This is assuming Ada did not have the obnoxious intention of embarrassing Beth with her inability to answer the *ne1*-question. A reviewer also points out that some speakers would accept (43-a) if *ne1* is replaced by *aa3*. This is likely because the question with *aa3* can be used as a way to complain that the talk wasn't delivered clearly. We leave open the question of why *ne1* does not have the same complaint use.

'Who eats shrimp? Do you wonder?'

(49) a. #Zi3ming4 aa3.
Ziming ALRT
'Ziming.'

b. #Ngo5 m4-zi1 aa3.
I also not-know ALRT
'I don't know.'

c. Zi3ming4 lo1.
Ziming UP
'Ziming.'

d. Hai6 lo1. (Ngo5 dou1 m4-zi1.)
yes UP I also not-know
'Right. I also don't know.'

Both the fragment response in (49-a) and the ignorance response in (49-b) are infelicitous as compared to the modified versions in (49-c) and (49-d). Let us probe the differences in each pair. Comparing (49-a) and (49-c) show that *lo1* is a better utterance particle than *aa3* in a fragment response. The difference, we argue, is because *aa3* requires that the answer is directly related to the question under discussion (Sybesma & Li 2007) while *lo1* indicates that the response should be obvious to the addressee (Fung 2000). Since a *ne1-ho2* question indicates that the speaker expects the addressee to possibly not know the answer, the addressee then needs to signal that this expectation is not met when offering a response. This additional signaling then makes it infelicitous to use *aa3*, which marks direct relevance.

The difference between (49-b) and (49-d) follows a similar explanation. By asking a *ne1-ho2* question the speaker indicates that they expect it to be possible for the addressee to not know the answer to the *ne1*-question. For this reason, it is more natural for the addressee to indicate their ignorance by acknowledging this expectation, with the help of the agreement marker *hai6 lo1* 'yes' and the additive *dou1* 'also' in (49-d). Without some agreement indicator a direct ignorance response sounds rude, as the addressee would be choosing to ignore the speaker's expectation. The fact that an affirmative particle can be used is also a telltale sign that a *ne1-ho2* question is a polar question (about force) rather than a *wh*-question. [16]

We do not know why the use of *aa3* in (i) is unacceptable. However, the fact that it is possible to use a negative answer as a response indicates that a *ne1-ho2*-question share important similarities with a polar question.

2.4 Interim summary

We have seen that the simplex particles indicating assertions (*gaa3*), biased polar questions (*me1*), and *wh*-questions (*ne1*) may all form clusters with the polar interrogative particle *ho2*. When *ho2* is absent, the simplex particles contribute basic sentence acts, as summarized in the left-hand side of Figure 6. When *ho2* is present, these sentence acts are turned into complex acts of polar questions, querying whether or not these sentence acts are performable by the addressee, as shown in the right-hand side of Figure 6.

We have provided evidence from the interpretation of particle clusters involving *ho2* that the complex sentence acts do not arise from a complex force operating on semantic content. Rather, they

[16] As expected, a negative answer to (48) is also possible when accompanied by an appropriate final particle, as shown below:

(i) M4-hai6 {lo1/#aa3}. Ngo5 m4-soeng2 zi1.
not-yes UP/ALRT I not-want know
'No. I don't want to know.'

p-gaa3 (decl.)	assertion		questioning if assertion can be performed
p-me1 (int.)	biased question	$\xrightarrow{ho2}$	questioning if biased question can be performed
Q-ne1 (int.)	neutral question		questioning if neutral question can be performed

Figure 6: Force shift with *ho2*

arise from anchoring a force-bearing expression, an unanchored sentence act, to the speaker and the addressee, in distinct ways. On the one hand, it requires the sentence act to be performed by the speaker as an anchor. On the other hand, it produces a polar question asking an addressee to confirm whether or not the sentence act is performable by them.

In the next section, we demonstrate how this operation on force-bearing expressions can be implemented in a framework of sentence act anchoring.

3 Proposal

We propose that *ho* embeds a force-bearing expression. What should be the meaning of a force-bearing expression? In one approach, the meaning is a sentence act, modeled as a context change potential (see Farkas & Bruce 2010; Rawlins 2010; Davis 2011; Northrup 2014; Malamud & Stephenson 2015; Farkas & Roelofsen 2017; Bledin & Rawlins 2019; Bhadra 2020). A context change potential is a relation between two contexts, or a function from contexts to contexts. On this view, a force-bearing expression, once fed an input context, generates a set of output contexts (or another output context).

However, in the approach of Gunlogson (2001), Davis (2009), Portner (2007, 2009), and Rudin (2018), sentence acts are generated in a *multi-step* fashion. A simple force-bearing expression does not directly yield a sentence act, but a function from discourse participants to sentence acts. These functions are referred to as *unanchored sentence acts* in this paper. Unanchored sentence acts can be turned into (anchored) sentence acts by taking a discourse participant as their argument, as proposed in Gunlogson (2001) and Rudin (2018).

In this study, we capitalize on the multi-step approach to model force shift. In particular, we argue for the presence of *anchoring functions*, which maps unanchored sentence acts to anchored sentence acts. Since there is no guarantee that the force associated with an unanchored sentence act is the same type of force associated with the corresponding anchored sentence act, force shift is at least a theoretical possibility.

We expand on this proposal in a few steps. Section 3.1 lays out the theoretical background and provides definitions for simplex sentence acts, which are treated as functions from discourse participants to sentence acts. Section 3.3 presents our analysis of *ho2*, which is basically an anchoring function. Section 3.4 and 3.5 illustrate how the proposal models the meaning of *ho*-questions.

3.1 Context and sentence acts

Context The backbone of our approach is formed by bringing together two pillars of discourse dynamics—the scoreboard approach (Gunlogson 2001, 2008, Farkas & Bruce 2010, Davis 2011, Ginzburg 2012, Roberts 2012, Malamud & Stephenson 2015, Bhadra 2020) and the commitment space approach (Krifka 2015, 2023; Kamali & Krifka 2020; a.o.). In the scoreboard approach, a

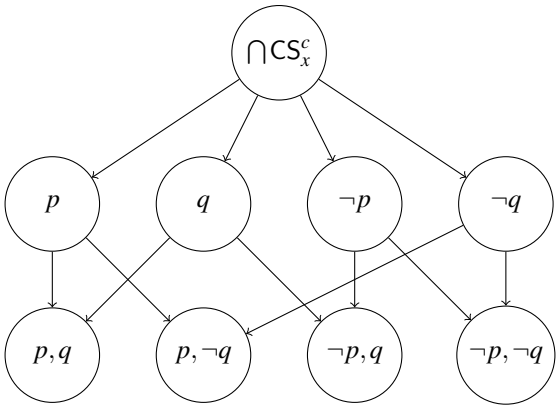

Figure 7: A sample commitment space for a participant x in context c

discourse context is assumed to be a tuple consisting of various conversational components, like a Stalnakerian context set (Stalnaker 1978), a set of discourse participants, commitment sets of the participants, a stack of issues, and many other components. Since not all of the conversational components are useful for our purposes in this paper, we define a context as a tuple consisting of a set P of discourse participants, a stack $\mathfrak{T}$ of issues (also known as 'Table'), and the commitment spaces CS of all discourse participants (x, y, z, etc.) involved in the context:

(50) A context c is a tuple of $\langle \mathsf{P}^c, \mathfrak{T}_c, \mathsf{CS}_x^c, \mathsf{CS}_y^c, ... \rangle$

Based on the commitment space approach, a commitment space CS_x^c is a set of x's possible discourse commitments S, as shown in (51). Specifically, the current discourse commitment that x holds, which is written as DC_x, is a set of propositions that x is currently committed to. It can be developed by adding new propositions. Collecting all possible future developments yields x's commitment space. As a consequence, x's current commitment space serves as the 'root' of their commitment space. Formally speaking, the root is reconstructed by intersecting all the discourse commitments in CS_x^c, i.e., $\bigcap \mathsf{CS}_x^c$.[17] A sample commitment space is provided in Figure 7.

(51) $\mathsf{CS}_x^c = \{C \mid \mathsf{DC}_x^c \subseteq C\}$

There are numerous proposals on what it means to have a discourse commitment towards a proposition (Searle 1969, 1979; MacFarlane 2005, a.o.). We take a discourse commitment to indicate a certain set of communicative consequences or effects associated with assertive acts. For concreteness, we follow MacFarlane (2011) and take a speaker's willingness to withdraw (if proven wrong), justify, and be responsible for a proposition to indicate that the proposition is a discourse commitment of the speaker's.

The common ground of a context is obtained by intersecting the roots of all involved commitment spaces, i.e., the participants' current discourse commitments, as shown in (52).

(52) $\mathsf{CG}^c = \bigcap \{ \bigcap \mathsf{CS}_x^c \mid x \in \mathsf{P}_c \}$

In this sense, the common ground contains proportions to which all discourse participants are

[17] Note that Krifka's system does not make use of tuples, as we do in this paper, to distinguish between different discourse participants' commitment sets.

currently committed. Furthermore, based on the common ground of a context, we can build a commitment space for all participants, defined as in (53).

(53) $\mathsf{CS}^c_{\mathsf{P}} = \{C \mid \mathsf{CG}^c \subseteq C\}$

According to Farkas & Bruce (2010), a crucial role of a sentence act is proposing an update of the common ground in a context. We incorporate this spirit into our approach by assuming that a sentence act proposes a way for updating the commitment space rooted in a common ground.

A so-called proposal is modeled as an issue stored in the stack of issues in a context. An issue is a set of commitment spaces, which represents different paths along which some current discourse commitments can be incremented. Once an issue is revolved, it will be popped off from the stack. Issues will be discussed in more detail shortly in relation to concrete force operators.

For easy reference, the key discourse components mentioned so far are summarized as follows:

Name	Notation
commitment space for x in c	CS^c_x
discourse commitment set for x in c	DC^c_x
commitment space for all participants in c	$\mathsf{CS}^c_{\mathsf{P}}$
common ground of c	CG^c

In anticipation of lexical definitions and compositionality, the semantic types used in our analysis is used in the following table, which includes the basic types, function types (schematized as $\alpha\beta$), and product types (schematized as $\alpha \times \beta$).

Object	Variable	Type	Type Abbrev.
individual	x, y, ...	e	
possible world	w, w', ...	s	
truth value		t	
proposition	p, q, ...	st	
commitment set	C, C', ...	$(st)t$	
commitment space	$\mathscr{C}$, $\mathscr{C}'$, ...	$((st)t)t$	s
issue		$(((st)t)t)t$	$\mathsf{s}t$
context	c, c', ...	$(et) \times (\mathsf{s}t \times ... \times \mathsf{s}t) \times \mathsf{s} \times ... \times \mathsf{s}$	c
sentence act		cc	t
unanchored sentence act	$\mathfrak{A}$, $\mathfrak{A}'$, ...	$e\mathsf{t}$	

Force operators Against this backdrop, we are ready to define sentential force operators. Following many earlier studies, we define a sentence act as a context change potential, i.e., a function mapping contexts to contexts. The overview offered in the introduction section has shown that a sentence act is generated through force operators. Specifically, we assume that every sentence consists of a content and force component: the force maps the content to a sentence act. For concreteness, the assertion operator **assert** is defined as in (54).

(54) **assert** $:= \lambda p \lambda x \lambda c.\ c'$ **such that** c' **differs from** c **only in the following components**

$$\mathsf{CS}_x^{c'} = \{C \in \mathsf{CS}_x^c \mid p \in C\}$$
$$\mathfrak{T}_{c'} = \mathfrak{T}_c \cdot \{\{C \in \mathsf{CS}_\mathsf{P}^c \mid p \in C\}\}$$
defined if $\bigcap((\cap \mathsf{CS}_x^c) \cup \{p\}) \neq \emptyset$ **otherwise undefined**.

Type: $(st)(et)$

In Cantonese, the particles *ge3* and *gaa3* are compatible with assertions, so we simply assume that the appearance of these particles marks the use of the assertion operator. Based on (54), this operator can be seen as a performance predicate expressing how an individual x updates an input context c with a proposition p. The output context is a context where the speaker's commitment space is updated with p and a new issue is added to the top of the stack. The issue is a singleton set of commitment spaces, which means that the speaker's assertion suggests one way of developing the common ground and they wait for the addressee's response. This matches the fact that an assertion can admit a response.

Similar to the assertion force operator, the neutral question force operator **quest**, which is usually marked by the particle *ne1* in Cantonese, can be defined as in (55), which can be understood as a performance predicate expressing how an individual x updates a context c with a question Q.

(55) **quest** $:= \lambda Q \lambda x \lambda c.\ c'$ **such that** c' **differs from** c **only in the following components**

$$\mathfrak{T}_{c'} = \mathfrak{T}_c \cdot \{\{C \in \mathsf{CS}_A^c \mid p \in C\} \mid p \in Q\}$$
defined if $\forall p \in Q. \bigcap((\cap \mathsf{CS}_x^c) \cup \{p\}) \neq \emptyset$ **otherwise undefined**.

Type: $((st)t)(et)$

According to Hamblin/Karttunen's approach (Hamblin 1973; Karttunen 1977), an interrogative clause denotes a set Q of propositions. We also follow Farkas & Bruce (2010) and assume that the main function of a question act is proposing alternative paths for the development of the commitment space rooted in the current common ground, as illustrated by the issue pushes onto the table in (55). In each path, the common ground is developed into sets including one proposition in Q. In addition, the definedness condition of a question act is that the speaker is *publicly* ignorant to the alternative paths. This is a fairly weak definedness condition as it does not require that the speaker does not know the answer to the question. As with assertions, we leave open the possibility that question acts come with more definedness conditions.[18]

In a similar fashion, an opposite bias polar question operator can be defined to capture the interpretation of the particle *me1*, which shows a bias opposite to the polarity of the prejacent proposition.[19]

(56) **ob-quest** $:= \lambda p \lambda x \lambda c.\ c'$ **such that** c' **differs from** c **only in the following components**

$$\mathfrak{T}_{c'} = \mathfrak{T}_c \cdot \{\{C \in \mathsf{CS}_A^c \mid q \in C\} \mid q \in \{p, \neg p\}\}$$
defined if $\forall q \in \{p, \neg p\} : \bigcap((\cap \mathsf{CS}_x^c) \cup \{q\}) \neq \emptyset$ **and** $\neg p \in \mathsf{Dox}_x$
otherwise undefined Type: $(st)(et)$

[18] This is likely too strong. A weaker alternative requirement is that p has not been *recently* added to the speaker's discourse commitment set.

[19] We define Dox_x^c and $\neg p$ as follows: $\mathsf{Dox}_x := \{p \mid x \text{ believes } p \text{ in } c\}$; $\neg p := \{w \mid w \notin p\}$.

Like ordinary questions with *ne1*, a biased polar question is only felicitous when the speaker has not made public what the answer to the question is, as indicated in the first definedness condition in (56). Despite this similarity, a biased question with *me1* differs from a neutral question with *ne1* in two important respects. First, like an assertion operator, it combines with a proposition. It yields a set of propositions by operating on the polarity of the proposition. A polar question can be formed by suggesting that some participant's discourse commitment set should either be updated by the positive proposition or the negative proposition. Second, a negative biased polar question carries a bias. In the case of *me1*, there is a bias towards the opposite of the polarity of its prejacent, as reflected in the second not-at-issue component in (56). This component requires that $\neg p$ is in the speaker's doxastic domain.

Unanchored sentence acts Based on the definitions in (54) and (55), a force operator is actually treated as a binary function mapping a semantic content and a discourse participant to a context change potential. That is, for each pair of sets of contexts representing a context transition, it specifies how a discourse participant may use a content to induce the discourse effects responsible for the context transition.

When fed a semantic content, the binary force operator yields a unary force operator from discourse participants to context change potentials. This kind of unary force operator, we argue following Gunlogson (2001), Davis (2011), and Rudin (2018), is an important building block of complex sentence acts in natural language. We refer to it as an *unanchored sentence act* and use the variable $\mathscr{A}$ of type et to stand for it. When all the felicitous conditions associated with the context change are met, the transition is successful.

To put it simply, an unanchored sentence act specifies the designed discourse effects, i.e., the force, without specifying for whom these effects should hold. For example, the assertive force associated with the declarative clause type specifies that someone's discourse commitment should be updated, but leaves it open as to which discourse participant is involved (Gunlogson 2001; Davis 2011). Usually, there are two participants involved in a discourse that may serve as an argument, or as an anchor, to an unanchored sentence act—the speaker and the addressee. In Gunlogson (2001), the falling and rising final intonation contours specify whether the participant involved in an assertion is the speaker (in the case of the falling intonation) or the addressee (in the case of the rising intonation) (cf. Gunlogson 2008). In Portner (2009), an imperative denotes an unanchored sentence act waiting to combine with the addressee.

As a default, every unanchored sentence act will eventually be anchored to the speaker. We further argue in this paper that an unanchored sentence act may not only take a participant argument, but it may itself serve as an argument for an *anchoring function*, which is a function that maps unanchored sentence acts to anchored sentence acts. The details will be spelled out in Section 3.3.

3.2 Partiality and force shift

Building on the definitions of the force operators, let us clarifies why sentential force is shiftable. Because of the definedness conditions that a force operator encodes, the corresponding sentence act is a partial function. In other words, a sentence act is undefined for a context that does not satisfy the definedness condition that it inherits from the relevant force operator. Given the partiality, the commitment space of an individual x performing an (unanchored) act $\mathfrak{A}$ can be divided into two classes for any sentence act: the satisfaction set (S-Set) that are defined for the act and the failure

set (F-Set) that are not, as defined in (57).

(57) Given a participant x's commitment space in a context c, i.e., CS^c_x, where $c[\mathsf{CS}^c_x/\mathscr{C}]$ is a new context differing from c only in that x's commitment space CS^c_x is replaced with one of its subsets $\mathscr{C}$,

a. $\mathsf{S\text{-}Set}(\mathfrak{A})(x)(c) = \bigcup\{\mathscr{C} \subseteq \mathsf{CS}^c_x \mid \mathfrak{A}(x)(c[\mathsf{CS}^c_x/\mathscr{C}])$ **is defined**$\}$

b. $\mathsf{F\text{-}Set}(\mathfrak{A})(x)(c) = \bigcup\{\mathscr{C} \subseteq \mathsf{CS}^c_x \mid \mathfrak{A}(x)(c[\mathsf{CS}^c_x/\mathscr{C}])$ **is undefined**$\}$

If a sentence act $\mathfrak{A}$ is defined relative to the new context, $\mathscr{C}$ is in S-Set; whereas, if $\mathfrak{A}$ is undefined relative to the new context, $\mathscr{C}$ is in F-Set. Conceptually, the S-Set and F-Set mirror two possible developments of the individual x's commitment space. Given the sentence act $\mathfrak{A}$, if x opts for the S-Set, it signifies a commitment to developing their commitment space toward the branch where performing $\mathfrak{A}$ is defined for them. By contrast, if x chooses the F-Set, they indicate a development along the branch where performing $\mathfrak{A}$ is undefined for them.

Recall the definitions of the question force operators **quest** and **ob-quest**, both of which generate a question act through providing alternative paths for developing the commitment space rooted in the common ground. In this sense, since the S-Set and F-Set related to a sentence act represents two alternative ways of developing an individual's commitment space, collecting these two sets gives rise to a polar question asking whether the individual can perform the sentence act or not. Therefore, any sentence act can be shifted to a polar question when its performer's commitment space is divide into a S-Set and a F-Set. In the next subsection, we will show that this division is the core function of the particle *ho2*.

Before delving into the semantics of *ho2*, it is worth highlighting the essential role commitment spaces play in supporting the generation of S-Set and F-Set. The traditional scoreboard approach records only participants' *current* discourse commitments. While it is possible to test whether a participant's current discourse commitments satisfy or fail a sentence act, it does not make sense to divide the commitments into a S-Set and a F-Set as a participant's current discourse commitments are *public* and hence already known to all participants. For this reason, an act can either be performed or not but there is no question about whether it can be performed or not. On the contrary, a commitment space consists of *future* possibilities, i.e., things that have not been said but can be said in the future. For this reason, it supports the generation of these two sets.[20]

3.3 *Ho2* as a sentence act anchoring function

We are now in a position to discuss our proposal for Cantonese *ho2*: the particle denotes a complex anchoring function. Specifically, *ho2* combines with an unanchored sentence act and anchors it to *both* the speaker and the addressee to return a (complex) sentence act, defined as in (58). Note that s_c and a_c refer to the speaker and the addressee in a conversation, respectively. It is more accurate to understand them as projection functions that extract from a set of contexts the two participants who are the speaker and the addressee in the current conversation.

[20] Despite the connection, our definition of questions is different from the commitment space approach of Krifka (2015) and related studies. For Krifka (2015), a question gives rise to a new commitment space with an original root. For us, a question gives rise to an issue, which is a set of commitment spaces.

(58) $[\![\text{ho2}]\!] = \lambda\mathfrak{A}\lambda c.\ c'$ **such that** c' **is the same as** $\underbrace{\mathfrak{A}(\mathsf{s}_c)(c)}_{c''}$ **except**

$$\mathfrak{T}_{c'} = \mathfrak{T}_{c''} \cdot \left\{ \begin{array}{l} \mathsf{S\text{-}Set}(\mathfrak{A})(\mathsf{a}_c)(c''), \\ \mathsf{F\text{-}Set}(\mathfrak{A})(\mathsf{a}_c)(c'') \end{array} \right\} \qquad \text{Type: } (et)\mathsf{t}$$

The anchoring is complex in two respects. First, it involves anchoring a speech act to both the speaker and the addressee. In this respect, it is similar to the particle *yo* in Japanese, which attributes discourse effects from unanchored sentence act to *all* participants in a discourse (Davis 2011). Note that this type of complexity is still straightforward. It can be deemed as sequential performance of two speech acts of the *same* type, one by the speaker and one by the addressee. A particle cluster involving *ho2*, however, is strictly more complex because the same unanchored sentence act, generates *different* types of sentence acts for different discourse participants. These speech acts include the following two parts:

1. The first part is a speaker-oriented component anchoring an unanchored sentence act $\mathfrak{A}$ to the speaker. This component is relatively simple—*ho2* merely maps a input context c to an output context c'' encoding the successful performance of a sentence act by the speaker, as long as the input is defined for the act.

2. The second part is an addressee-oriented component representing a *polar question* about whether or not the unanchored sentence act can be anchored to the addressee to generate a full-fledged sentence act. It should be noted that the issue is about the addressee's commitment space, rather than the commitment space rooted in the common ground. This act is evaluated relative to the output context c'' of the speaker-oriented act. Given that this is a polar question, the issue under discussion involves two possible developments of the addressee's discourse commitments, as shown below.[21]

$$\left\{ \begin{array}{l} \mathsf{S\text{-}Set}(\mathfrak{A})(\mathsf{a}_c)(c''), \\ \mathsf{F\text{-}Set}(\mathfrak{A})(\mathsf{a}_c)(c'') \end{array} \right\} = \left\{ \begin{array}{l} \bigcup\{\mathscr{C} \subseteq \mathsf{CS}^{c''}_{\mathsf{a}_c} \mid \mathfrak{A}(x)(c''[\mathsf{CS}^{c''}_{\mathsf{a}_c}/\mathscr{C}]) \textbf{ is defined}\}, \\ \bigcup\{\mathscr{C} \subseteq \mathsf{CS}^{c''}_{\mathsf{a}_c} \mid \mathfrak{A}(x)(c''[\mathsf{CS}^{c''}_{\mathsf{a}_c}/\mathscr{C}]) \textbf{ is undefined}\} \end{array} \right\}$$

   One set (S-Set) includes the addressee's possible commitments that allows them to perform the act; whereas, the other (F-Set) includes the addressee's possible commitments that prevents them from performing the act.

We would like to clarify that moving to a set against which performance of an act is defined is different from performing the act, even against the same input context. For example, in the case of an assertion the former merely requires that all output contexts are compatible with a proposition p, while the latter requires that p be added to all output contexts. This is not to say that it is impossible to define a pragmatic process that strengthens performability to performance. However, we leave this option open in this study.

[21] Not all studies model polar questions as a set of two possibilities. For example, Bolinger (1978), Gawron (2001), Van Rooy & Safarova (2003), Biezma (2009), Biezma & Rawlins (2012), Roelofsen & Farkas (2015), Bhadra (2020) treat polar questions as consisting of a singleton answer, while earlier studies like Hamblin (1973) treat them as consisting of both positive and negative answers. We are not committed to a particular treatment of polar questions in this study. If polar questions turn out to be more amendable to a singleton analysis, the analysis proposed here can be recast along the lines of the singleton approach.

Ho2 as an anchoring function is of type $(e\mathtt{t})\mathtt{t}$ and can be strictly more expressive than discourse participants, which are taken to have the type e. The relationship between discourse participants and anchoring functions mirrors the relationship between individuals (type e) and individual quantifiers (type $(et)t$) in static quantifier semantics. The presence of anchoring functions should not come as a surprise if discourse participants themselves play any role in compositional semantics, as suggested in studies like Speas & Tenny (2003), Gunlogson (2001) and Davis (2011). After all, they are just higher-order discourse participants, or dynamic quantifiers.

The force-transforming capacity of *ho2* can also be gleaned from its type. A function from an unanchored sentence act $(e\mathtt{t})$ to an anchored sentence act $\mathtt{t}$ is a function capable of transforming the sentence act in the process of anchoring it as long as there is no requirement that the input $\mathtt{t}$ and the output $\mathtt{t}$ have the same force type.

What kinds of force transformation is allowed? Without constraints, any force type can in principle be transformed into another force type. This may indeed be desirable, as indirect speech acts are robust (Beyssade & Marandin 2006) and many simple forces have been analyzed as consists of even more primitive forces (Searle & Vanderveken 1985; Lauer 2013; Krifka 2023). However, we think the decision should be empirically informed. Since commonly attested force shifts yield polar questions, we believe there is something very natural about shifting any force to a polar question. We attribute this naturality to the fact that most sentence acts, if not all, are partial. For this reason, trying to find out whether a context is defined or undefined for a sentence act is an informative move and it is essentially the discourse function of *ho2*. In other words, we can make sense of why *ho2* is so readily compatible with any force type—any force type yields sentence acts that may be defined or undefined for a given input context. Of course, if there are force types that are incompatible with *ho2*, then they provide an important testing ground for the present proposal. We investigate these cases in section 4.

In the next two subsections, we show in more detail how the proposed speech act anchoring semantics for *ho2* interact with force-indicating utterance particles in Cantonese to yield the desirable semantics for relevant particle clusters.

3.4 Modeling ASSERTION-HO clusters

Let's use (59) as an example to demonstrate how the definition of *ho2* in (58) captures clusters involving *ho2* and a declarative particle like *gaa3*. Assuming that *gaa3* triggers the application of an assertion operator, it first combines with a proposition to yield an unanchored assertion, a function from discourse participants to context change potentials. *Ho2* as a sentence act anchoring function then combines with this unanchored assertion to yield not a simple anchored assertion involving only one participant, but a complex sentence act anchored to both the speaker and the addressee , as shown in (60).

(59) Zi3ming4 sik6 haa1 **gaa3 ho2**?
Ziming eat shrimp ASRT HO
'Ziming eats shrimp. Right?'

(60) $[\![\text{ho2}]\!](\textsf{assert}\ ([\![\text{Ziming eats shrimp}]\!])) =$

$$\lambda c.\ c' \textbf{ such that } c' \textbf{ is the same as } \underbrace{[\textbf{assert } [\![\text{Z-E-S}]\!](\mathsf{s}_c)(c)]}_{c''} \textbf{ except}$$

$$\mathfrak{T}_{c'} = \mathfrak{T}_{c''} \cdot \left\{ \begin{array}{l} \mathsf{S\text{-}Set}(\textbf{assert } [\![\text{Z-E-S}]\!])(\mathsf{a}_c)(c'')) \\ \mathsf{F\text{-}Set}(\textbf{assert } [\![\text{Z-E-S}]\!])(\mathsf{a}_c)(c'')) \end{array} \right\}$$

The complex sentence act has a speaker-oriented component and an addressee-oriented component. Given an input context c, the speaker-oriented component is an assertion act anchored to the speaker, which produces the following context c'' defined for the assertion.

(61) c'' **differs from** c **only in the following components** :

a. $\mathsf{C}^{c''}_{\mathsf{s}_c} = \{C \in \mathsf{CS}^c_{\mathsf{s}_c} \mid [\![\text{Z-E-S}]\!] \in C\}$

b. $\mathfrak{T}^{c''} = \mathfrak{T}_c \cdot \{\{C \in \mathsf{CS}^c_{\mathsf{P}} \mid [\![\text{Z-E-S}]\!] \in C\}\}$

The addressee-oriented component is a polar question act enquiring whether the addressee's commitment state is in the F-Set of the assertion performance or in the S-Set of the assertion performance. The issue under discussion is derived as follows. First of all, the addressee's commitment space in c'' is replaced with its subsets $\mathscr{C}$, generating different contexts c''' (i.e., $c''[\mathsf{C}^{c''}_{\mathsf{a}_c}/\mathscr{C}]$), as exemplified below.

(62) Given $\mathscr{C}$ is a subset of $\mathsf{C}^{c''}_{\mathsf{a}_c}$, c''' **differs from** c'' **only in that** $\mathsf{C}^{c'''}_{\mathsf{a}_c} = \mathscr{C}$.

Then, it is tested if the addressee can perform the same assertion in c''. If so, then C must be consistent with the propositional content; if not, then C must contain a member that is contrary to the propositional content. Based on this test, the addressee's commitment space can be divided into a F-Set and a S-Set, which form the issue raised by the *ho2*-question. Given c'' and c''', the output contenxt c'' of (59) can be represented as follows.

(63) c' **differs from** c'' **only in the following components** :

a. $\mathfrak{T}^{c'} = \mathfrak{T}_{c''} \cdot \left\{ \begin{array}{l} \bigcup\{\mathscr{C} \in \mathsf{C}^{c''}_{\mathsf{a}_c} \mid \textbf{assert}[\![\text{Z-E-S}]\!](\mathsf{a}_c)(c''[\mathsf{C}^{c''}_{\mathsf{a}_c}/\mathscr{C}]) \textbf{ is defined}\} \\ \bigcup\{\mathscr{C} \in \mathsf{C}^{c''}_{\mathsf{a}_c} \mid \textbf{assert}[\![\text{Z-E-S}]\!](\mathsf{a}_c)(c''[\mathsf{C}^{c''}_{\mathsf{a}_c}/\mathscr{C}]) \textbf{ is undefined}\} \end{array} \right\}$

If the addressee chooses the S-Set of the assertion performance, the development of their commitment space would be compatible with the propositional content *Ziming eats shrimp*. If they choose the F-Set of the assertion performance, then the development would be incompatible with the propositional content.

Accordingly, the particle *ho2* creates a question out of an assertion by tapping into the definedness condition of the assertion. Since an input context either yields a defined transition or an undefined transition, the question thus created is a polar question. The polar question can be answered just like any other polar question, with an affirmative answer or a negative answer. However, since this is not a polar question about content, but a polar question about assertability of content, the answer strategy requires some explanation. Empirically, the range of possible answers, as discussed in section 2.2, is repeated below in (64).

(64) a. Affirmative: Hai6 aa3. 'Yes.'

b. Negative: M4-hai6 aa3. 'No.'

c. Ignorant: Ngo5 m4zi1 wo3. 'I don't know.'

The positive answer amounts to affirming that an assertion is performable for the addressee.[22] The negative answer, however, does not simply mean that an assertion is not performable. Rather, it undergoes some kind of strengthening to mean that the addressee asserts the opposite propositional content. We leave open how to model the strengthening process.

A response indicating ignorance is also possible. We take it to signal that the assertion by the addressee is undefined. To model this, an assertion operator needs to have an extra definedness condition, such as the willingness to serve as the source of a proposition or to substantiate the proposition when it is challenged (Gunlogson 2008; MacFarlane 2011). We largely leave open how extra definedness conditions of assertions should be modeled in this study. However, it is worth noting that if the present enterprise of constructing speech act-level questions from definedness conditions of speech acts is on the right track, we should expect interactions of felicitous conditions and speech act-level questions. In section 4.2, we explore some of these consequences using question acts with more definedness conditions.

3.5 Modeling QUESTION-HO clusters

The proposed analysis can also account for the interpretive properties of *ho* attaching to questions. Consider (65), repeated from (38). Based on the assumption that *ho* combines with an unanchored sentence act, the question in (65) can be interpreted as (66).

(65) Bin1go3 sik6 haa1 **ne1** **ho2**?
who eat shrimp WHQ HO
'Who eats shrimp, do you also wonder?'

(66) $[\![\text{ho2}]\!](\textbf{quest}\ ([\![\text{who eats shrimp}]\!])) =$

$$\lambda c.\ c' \textbf{ such that } c' \textbf{ is the same as } \underbrace{[\textbf{quest}\ [\![\text{W-E-S}]\!](\mathsf{s}_c)(c)]}_{c''} \textbf{ except}$$

$$\mathfrak{T}_{c'} = \mathfrak{T}_{c''} \cdot \left\{ \begin{array}{l} \mathsf{S\text{-}Set}(\textbf{quest}\ [\![\text{W-E-S}]\!])(\mathsf{a}_c)(c'')) \\ \mathsf{F\text{-}Set}(\textbf{quest}\ [\![\text{W-E-S}]\!])(\mathsf{a}_c)(c'')) \end{array} \right\}$$

In simple words, (66) raises two issues. The first issue is asking who eats shrimp, while the second issue, which is the top one on the table, is asking the addressee whether or not *who eats shrimp* is a performable question act for them. Given the definition of a question act in (55), the second issue divides the addressee's commitment space into the S-Set and the F-Set based on the question act asking *who eats shrimp*.

The contexts in the S-Set support the definedness conditions associated with the question act, namely, that the addressee's current discourse commitments are compatible with any possible answers to the question. Conversely, an output context that belongs in the F-Set does not support the performance of the question. Given the definedness condition associated with the question act, this means either the addressee has committed to the answer to the question, or that the addressee's discourse commitments would contradict any possible answers to the question.

A polar question constructed based on a partial question act resembles a polar question constructed from a partial assertive act in admitting both an positive answer and a negative answer, as

[22] Following Krifka's (2013) suggestion about English response particles like *right* or *okay*, we assume that the affirmative morpheme *hai* in Cantonese can refer to speech acts.

pointed out in section 2.3.2. A positive (or negative) answer to the polar *ne1-ho2*-question amounts to affirming (or denying) that the question act involving *ne1* can be performed. Since performing a question act is typically conditioned by a weak implicature of ignorance, the positive answer to the *ne1-ho2* polar question in (65) is incompatible with an answer to the lower *ne1* question, as demonstrated below:

(67) Hai6 lo1. (#Ming4zai2 aa3.)
right UP Mingzai ALRT
'Right. Mingzai (eats shrimp).'

The polar question *ho2* creates based on a *ne1*-question is essentially a question seeking to confirm whether the *ne1*-question is shared by the addressee. For this reason, it is compatible with previous studies' understanding of *ho2* as a confirmational particle (Lam 2014). It also explains why *ne1-ho2* questions differ from *ne1*-questions in terms of context of use, as discussed in Section 2.3.2. A *ne1-ho2* question is appropriate when the speaker does not expect the addressee to know the answer to the *ne1* question, contrary to a *ne1* question, which has no such expectation.

A cluster involving *ho2* and the biased polar question particle *me1* can be analyzed along the same lines as a *ne1-ho2* cluster. Recall that *me1* takes a proposition and turns it into an unanchored polar question act with a bias against the proposition. When a *me1*-question is embedded under *ho2*, the entire form becomes a polar question seeking to confirm whether the addressee may perform the biased polar question or not. Consider a *me-ho2* interrogative repeated in (68) from section 2.3.1 and the interpretation given in (69), based on the definition of **ob-quest** offered earlier in (56) .

(68) Zi3ming4 sik6 haa1 **me1 ho2**?
who eat shrimp BPQ HO
'Ziming eats shrimp? Do you also wonder?'

(69) $[\![\text{ho}]\!](\textbf{ob-quest}\ [\![\text{Ziming eats shrimp}]\!]) =$

$$\lambda c.\ c' \textbf{ such that } c' \textbf{ is the same as } \underbrace{[\textbf{ob-quest}\ [\![\text{Z-E-S}]\!](\mathsf{s}_c)(c)]}_{c''} \textbf{ except}$$

$$\mathfrak{T}_{c'} = \mathfrak{T}_{c''} \cdot \left\{ \begin{array}{l} \mathsf{S\text{-}Set}(\textbf{ob-quest}\ [\![\text{Z-E-S}]\!])(\mathsf{a}_c)(c''), \\ \mathsf{F\text{-}Set}(\textbf{ob-quest}\ [\![\text{Z-E-S}]\!])(\mathsf{a}_c)(c'') \end{array} \right\}$$

If the S-Set of the bias question act is chosen, it indicates that the addressee has not publicly been committed to the positive proposition (i.e., *Ziming eats shrimp*) or the negative proposition (i.e., *Ziming doesn't eat shrimp*), but they are biased to the negative proposition. Alternatively, the addressee may choose to identify an input context as undefined for the biased polar question act, due to, for example, the addressee not sharing the bias. In this case, the output contexts do not support a bias to the negative proposition.

For this reason, if the addressee responds with a positive answer, it suggests that the addressee shares the speaker's bias (towards the opposite polarity of the prejacent proposition). If a negative answer is chosen, it suggests that the addressee does not share the speaker's bias. Both answer strategies have been discussed in section 2.3.1.

4 Applications and extensions

We have proposed that the Cantonese final utterance particle *ho2* operates on unanchored sentence acts to generate a polar question seeking to confirm whether or not the sentence act can be anchored to the addressee. We have also argued that unanchored sentence acts, marked with simplex particles, are widespread in Cantonese and they are all compatible with *ho2* in principle. However, in reality there are final particles that may not form a cluster with *ho2* in any context, as well as contexts in which an otherwise acceptable *ho2* cluster is unacceptable. In this section, we show that these cases, too, follow from the proposed anchoring semantics of *ho2*.

4.1 Questions that the addressee knows the answer to

Although a *ne1-ho2* cluster is a well-formed cluster in Cantonese with a well-defined interpretation, there are certain contexts in which such a question is unacceptable. According to the proposed analysis, a question-*ho2* structure asks whether or not the lower question act can be anchored to the addressee. As already pointed out earlier, this typically happens when the speaker has reasons to suspect that the addressee cannot answer the question. Consequently, if a speaker knows for sure that the addressee is able to answer a question, they would not choose to embed the corresponding question under *ho2*. For this reason, it is predicted that *ho2* is not compatible with a question that the addressee clearly may answer. This prediction is indeed borne out by the following example:

(70) **Getting to know someone's name**
Context: Annie is a receptionist at a dentist office. Bill walked in and said they had an appointment. Annie asked:

(71) a. Nei5 giu3 me1 meng2 **ne1**?
you call what name WHQ
'What is your name?'
b. #Nei giu3 me1 meng2 **ne1 ho2**?
you call what name WHQ HO
'What is your name? Do you also wonder?'

This question is judged odd as the addressee knows his own name in normal circumstances. For this reason, the question embedded by *ho2* is not one that would typically be shared by the addressee.[23]

4.2 Addressee-directed questions

In Cantonese, questions may end with final utterance particles other than *ne1* or *me1*, as briefly mentioned in section 2.1. For example, to indicate a polar question, the particle *maa3* may be used, as shown in (72). The particle *aa3* can also be used in *wh*-questions, as shown in (73).[24]

(72) Aa3man4 sik6 haa1 **maa3**?
Aaman eat shrimp POLQ
'Does Aaman eat shrimp?'

(73) Lei1-go3 hai6 me1 ji3si1 **aa3**?
this-Cl is what mean ALRT
'What does this mean?'

[23] In exceptional circumstances such as one in which the addressee suffers from amnesia, this question would be deemed acceptable.

[24] Like *ne1*, *aa3* may also be used in A-not-A questions and alternative questions.

Normally, *ho2* may not be added to questions marked by *maa3* and *aa3*, as demonstrated in (74) and (75).

(74) #Aa3man4 sik6 haa1 **maa3 ho2**?
Aaman eat shrimp POLQ HO
'Does Aaman eat shrimp? Do you wonder?'

(75) #Lei1-go3 hai6 me1 ji3si1 **aa3 ho2**?
this-Cl is what mean ALRT HO
'What does this mean? Do you wonder?'

However, the infelicitous use of the questions can be remedied by *changing the addressee*, an example of which is given in (76) and (77).

(76) **Addressee change**
Annie, Ben, and Cindy were discussing their math assignment. Annie was stumped by a formula, and she thought that Cindy probably knows what the formula means, because Cindy got an A in the last math quiz. In addition, Annie thought that Ben might also ask Cindy the same question. In this situation, Annie could ask (↱ indicates a head turn from Cindy to Ben, indicating a change of addressee):

(77) Lei1-go3 hai6 me1 ji3si1 **aa3** ↱ **ho2**?
this-CL be what mean ALRT HO
'(To Cindy) What does this mean? (To Ben) Do you also wonder?'

This question is acceptable as long as the speaker signals that the inner question and the outer question are not directed to the same person. (74) can be remedied in the same way.

(78) Aa3man4 sik6 haa1 **maa3** ↱ **ho2**?
Aaman eat shrimp POLQ HO
'(To Cindy) Does Aaman eat shrimp? (To Ben) Do you also wonder?'

Intuitively, in both examples, the speaker expects that the addressee of the inner question is capable of answering the inner question. The outer question cannot be directed to the same addressee, precisely because that addressee is already expected to answer the inner question.

We attribute this expectation to *maa3* and *aa3*. Interestingly, it can be shown that while *ne1*-questions may be used with or without an addressee present, their *maa3* and *aa3* counterparts may only be used when an addressee is present. For concreteness, the felicity of questions in (79-a) – (79-c) in addressee-present and addressee-absent contexts are summarized in Table 2.[25]

(79) a. Betty sik6-m4-sik6 zyu1gu1lik1 **ne1**?
Betty eat-not-eat chocolate WHQ
'Does Betty eat chocolate?'

[25] *Ne1*-questions can be used as self-directed questions, which as a speech act are felicitous when the answer is not known to the speaker (see Garrett 2001 for Tibetan, Murray 2010 for Cheyenne). Based on these cross-linguistic facts, Bhadra (2020) analyzes self-directed questions and rhetorical questions as being speech acts that do not raise issues, unlike true information-seeking questions. *Ne1* questions are thus compatible with being both information seeking as well as non-information seeking questions.

Context	*ne1*	*aa3*	*maa3*
Addressee-present: Annie wanted to give her neighbor Betty a pack of chocolate but she didn't know if Betty ate chocolate. She saw Betty's brother and asked him...	OK	OK	OK
Addressee-absent: Annie wanted to give her neighbor Betty a pack of chocolate but she didn't know if Betty ate chocolate. So, she wondered to herself...	OK	#	#

Table 2: Addressee-present vs. Addressee-absent questions

b. Betty sik6-m4-sik6 zyu1gu1lik1 **aa3**?
Betty eat-not-eat chocolate ALRT
'Does Betty eat chocolate?'

c. Betty sik6 zyu1gu1lik1 **maa3**?
Betty eat chocolate POLQ
'Does Betty eat chocolate?'

We take the distinct contextual requirements to indicate that *maa3* and *aa3* have an additional definedness condition requiring the obligatory presence of an addressee who is expected to answer the question. It is this additional definedness condition that triggers an incompatibility with *ho2*.

Concretely, using *aa3* as an example, an slightly more complex question operator is defined in (80).[26] This question operator can be used for *wh*-questions, polar questions, alternative questions, or polar-alternative questions.

(80) $\textbf{quest}_{\mathsf{a}} := \lambda Q \lambda x \lambda c.\ c'$ **such that** c' **differs from** c **only in the following components**
$\mathfrak{T}_c \cdot \{\{C \in \mathsf{CS}^c_{\mathsf{a}_c} \mid p \in C\} \mid p \in Q\}$
defined if $x \neq \mathsf{a}_c$ **and** $\forall p \in Q. \bigcap((\cap \mathsf{CS}^c_x) \cup \{p\}) \neq \emptyset$
otherwise undefined. Type: $((st)t)(e\mathsf{t})$

Based on this definition, a question marked by *aa3* is asking about the development of the addressee's commitment space, instead of the development of the commitment space rooted in the common ground. Hence, the addressee is expected to resolve the relevant issue, because they should be able to decide how their commitment space is developed. In addition, *aa3* has an extra definedness condition requiring that the addressee in the input context be a different individual from the anchor x of its associated question act. Thus, an *aa3* marked question cannot be used when the addressee is absent.

Combining a question marked by *aa3* with *ho*2 without any signal of addressee shift results in an odd question. Consider (75), the denotation of which is represented as (81).

(81) $[\![\text{ho}]\!](\textbf{quest}_{\mathsf{a}}\ [\![\text{what does this mean}]\!]) =$

[26] The definition in (80) needs to be slightly modified for *maa3* so that it only yields a polar question.

$$\lambda c.\ c' \textbf{ such that } c' \textbf{ is the same as } \underbrace{[\textbf{quest}_{\mathsf{a}}\ [\![\text{W-T-M}]\!](\mathsf{s}_c)(c)]}_{c''} \textbf{ except}$$

$$\mathfrak{T}_{c'} = \mathfrak{T}_{c''} \cdot \left\{ \begin{array}{l} \mathsf{S\text{-}Set}(\textbf{quest}_{\mathsf{a}}\ [\![\text{W-T-M}]\!])(\mathsf{a}_c)(c'')), \\ \mathsf{F\text{-}Set}(\textbf{quest}_{\mathsf{a}}\ [\![\text{W-T-M}]\!])(\mathsf{a}_c)(c'')) \end{array} \right\}$$

Informally, (81) captures such a question act: the speaker asks the addressee what this means and expects that the addressee answers this question; then, they continue to ask the addressee whether or not the addressee can ask himself or herself the same question. The second part of the question act does not make sense, because, if the speaker expected that the addressee answer the question, they would not ask if the addressee share the same question. Additionally, due to the other-directed requirement of $\textbf{quest}_{\mathsf{a}}$, namely, that the questioner of *What does this mean* must not be the one to answer the question, the addressee himself or herself cannot perform the act '$\textbf{quest}_{\mathsf{a}}([\![\text{w-t-m}]\!])$'. Otherwise, we would run into a contradiction, shown as follows.

(82) For any $\mathscr{C} \subseteq \mathsf{CS}^{c''}_{a_{c''}}$, $\textbf{quest}_{\mathsf{a}}([\![\text{W-T-M}]\!])(\mathsf{a}_c)(c''[\mathsf{CS}^{c''}_{a_{c''}}/\mathscr{C}])$ **is defined only if**
$\mathsf{a}_c \neq \mathsf{a}_{c''}$ **and** $\forall p \in [\![\text{W-T-M}]\!] : \bigcap((\cap\mathscr{C}) \cup \{p\}) \neq \emptyset$

The output contexts in c'' yielded by the speaker's question act does not change the speaker and the addressee in the current conversation. As a result, a_c is actually the same as $\mathsf{a}_{c''}$, contrary to the other-directed requirement in (82). Therefore, any subsets of the addressee's commitment space must be in the F-Set, and (81) leads to a non-inquisitive question, which we take to be responsible for degrading the sentence.[27]

The present analysis not only accounts for the deviance of (75), but also the felicity of (77), which has an addressee shift operation. Given this operation, the addressee of the inner question marked by *aa3* is distinct from the addressee of the outer question marked by *ho*. The change of addressee is signaled by the action of the speaker turning their head, i.e., ↱. Addressee shift is an under-explored phenomenon warranting more research. However, for concreteness we offer the following formulation ($g_1 := g(1)$):

(83) $[\![\text{↱}_1\ \text{ho2}]\!]^g = \lambda\mathfrak{A}\lambda c.\ c'$ **such that** c' **is the same as** $\underbrace{\mathfrak{A}(\mathsf{s}_c)(c)}_{c''}$ **except**

$$\mathfrak{T}_{c'} = \mathfrak{T}_{c''} \cdot \left\{ \begin{array}{l} \mathsf{S\text{-}Set}(\mathfrak{A})(g_1)(c''), \\ \mathsf{F\text{-}Set}(\mathfrak{A})(g_1)(c'') \end{array} \right\} \qquad \text{Type: } (et)\mathtt{t}$$

The action ↱ bears an index that is linked to the person who the speaker turns to. Combining with ↱, *ho* leads to a question asking whether or not performing the sentence act A is felicitous for the person yielded by g_1, instead of the addressee of A. Based on this formulation, the denotation of (77) is computed as follows.

(84) $[\![\text{↱}_1\ \text{ho}]\!]^g(\textbf{quest}_{\mathsf{a}}[\![\text{what does this mean}]\!]) =$

[27] This solution is not without problems. For one thing, it is well known that rhetorical questions may admit only one answer. However, they are acceptable in many languages, including Cantonese.

$$\lambda c.\ c' \textbf{ such that } c' \textbf{ is the same as } \underbrace{[\textbf{quest}_{\mathsf{a}}\ [\![\text{W-T-M}]\!](\mathsf{s}_c)(c)]}_{c''} \textbf{ except}$$

$$\mathfrak{T}_{c'} = \mathfrak{T}_{c''} \cdot \left\{ \begin{array}{l} \mathsf{S\text{-}Set}(\textbf{quest}_{\mathsf{a}}\ [\![\text{W-T-M}]\!])(g_1)(c'')), \\ \mathsf{F\text{-}Set}(\textbf{quest}_{\mathsf{a}}\ [\![\text{W-T-M}]\!])(g_1)(c'')) \end{array} \right\}$$

Given the addressee shift context in (77), (84) asks whether or not the new addressee Ben (assuming $g_1 = \mathsf{b}$) would like to ask the earlier addressee Cindy (a_c) the *aa3*-interrogative *What does this mean-aa3*, a question act defined for the speaker. Since it is possible for the two people to perform the same type of question act involving the inner *aa3*-interrogative, this outer *ho2*-interrogative is inquisitive, and hence is acceptable.[28]

4.3 Imperatives

The incompatibility of *ho2* with *aa3*-marked questions leads us to expect that *ho2* may also be incompatible with imperatives unless a switch addressee strategy is involved. Usually, a speaker who performs an imperative has expectations on the addressee, like *aa3*-marked questions. Indeed, *ho2* is incompatible with imperatives regardless of whether they are an order, invitation, or suggestion, as shown in (85) – (87).[29] In addition, also like *aa*-marked questions, they can be improved if addressee switch is involved.

(85) Saan1 coeng1 **aa3** *(↱) **ho2**?
close window IMP HO
(To Addressee A) 'Close the window!'
(To Addressee B/*A) 'Can you perform the request?' (Request + *(↱) + *ho*)

(86) Sik6 di1 Saang1-gwo2 **laa1** *(↱) **ho2**?
eat Cl fruit IMP HO
(To Addressee A) 'Have some fruits!'
(To Addressee B/*A) 'Can you perform the invitation?' (Invitation + *(↱) + *ho*)

(87) Tong4 lei5 dou6si1 king1 do1-di1 **laa1** *(↱) **ho2**?
with you advisor talk more-Cl IMP HO
(To Addressee A) 'Talk to your advisor more often!'
(To Addressee B/*A) 'Can you perform the suggestion?' (Suggestion + *(↱) + *ho*)

Recall that *ne1*-questions are compatible with *ho2* because *ne1* does not explicitly identify the addressee of the question act. A similar pattern also shows up in imperatives—when an imperative does not make reference to the addressee but all conversational participants, then it is acceptable, as exemplified by the following examples.

[28] It is worth pointing out that the declarative *aa3* also cannot be used when there is no addressee. This suggests that it may also specify the addressee like the interrogative *aa3*. However, the declarative *aa3* is nonetheless compatible with *ho2*. We take this to indicate that it is not merely the addressee specification that is problematic for *ho2*. Rather, it is the interaction of the addressee specification and the definedness condition of an unanchored sentence act that causes issues for *ho2*. We reserve the role of the addressee specification in assertions for future research.

[29] Imperative clauses may admit a range of markers, include *aa3* and *laa1*. As noted earlier, *aa3* may appear in different types of clauses. We gloss it as IMP based on its environment.

(88) a. Cin1kei4 m4-hou2 lok6jyu5 **aa3** **ho2**?
please not-good rain ALRT HO
'Please don't rain. Can you perform the wish?'
b. Jat1ding6 jiu3 zung3zoeng2 **aa3** **ho2**?
necessarily need jackpot ALRT HO
'Please let us win. Can you perform the wish?'

The semantics and pragmatics of imperatives have received much attention in the literature and it is beyond the scope of the present paper to defend any particular proposals. However, we still think that it is possible to distill some insights from the literature on imperatives to shed light on why addressee-directed imperatives are incompatible with *ho2*.

What underlies the incompatibility is a principle very similar to the condition of *aa3*-marked questions that bans the self-questioning use. As discussed in Condoravdi & Lauer (2012) (see also Farkas 1988), imperatives always imply a minimization of speaker involvement. On typical directive uses, like (85)–(87), a speaker attempts to get the addressee to realize the content. In other words, after uttering an imperative, the speaker is to do nothing, but the addressee is to realize the content of an imperative. Based on this observation, Condoravdi & Lauer (2012) propose an informal conventional meaning component, as in (89), for imperatives:

(89) **Minimal involvement of the speaker** The speaker takes it to be possible and desirable that, after his utterance, there is no action on his part that is necessary for the realization of the content. (Condoravdi & Lauer 2012: 48)

Given this, consider what would happen when an addressee-directed imperative is embedded under *ho2*—the addressee is asked whether or not they may perform an imperative act directed to himself or herself, which violates the minimal involvement requirement. By contrast, once the addressee is switched, the addressee-directed imperative under *ho* is not directed to the current addressee himself or herself, but the earlier addressee. The condition in (89) is not violated.

4.4 Extension to related phenomena

If force shift to polar questions arises in the process of anchoring a sentence act, we should expect a variety of force shift, corresponding to different anchoring functions. This section explores a few anchoring functions and what types of force shift they may correspond to in natural language.

To begin with, Beyssade & Marandin (2006), Lam (2014), and Heim et al. (2016) have identified a class of discourse particles called confirmationals, which includes Cantonese *ho2*, English *right*, Canadian English *eh*, Spanish *si* and *no*, and Medumba *a*. According to Heim et al. (2016), these particles serve the grammatical function of calling on the addressee to confirm a sentence act. To the extent that confirmationals are indeed a natural class, sentence act anchoring can be seen as a way of modeling these confirmationals and their different flavors.

If confirmational particles correspond to an anchoring function that anchors a sentence act to both the speaker and the addressee (in different ways), it is imaginable that a simpler anchoring function may be formed anchoring a sentence act just to the speaker or just to the addressee. We think both types of anchoring functions are found in natural language.

First, consider the anchoring function that anchors a sentence act to the addressee but not the speaker. Such an anchoring function, as given in (90), yields an polar question about whether the

addressee may perform a sentence act or not without requiring that the speaker performs the act.[30]

(90) $f_{\mathsf{a}} = \lambda\mathfrak{A}\lambda c.\ c'$ **such that** c' **differs from** c **only in the following components**

$$\mathfrak{T}_{c'} = \mathfrak{T}_c \cdot \left\{ \begin{array}{l} \mathsf{S\text{-}Set}(\mathfrak{A})(\mathsf{a}_c)(c), \\ \mathsf{F\text{-}Set}(\mathfrak{A})(\mathsf{a}_c)(c) \end{array} \right\} \qquad \text{Type: } (e\mathsf{t})\mathsf{t}$$

This anchoring function has the potential of modeling force shift involving so-called inquisitve rising declaratives in English, which are known to lack speaker commitment (Gunlogson 2001, Rudin 2018, Farkas & Roelofsen 2017). However, it is worth pointing out that many studies also attribute a weak commitment or bias component to rising declaratives in English, which (90) is not equipped to model without further assumptions.

Second, consider the anchoring function anchoring a sentence act to the speaker but not the addressee, as shown in (91).

(91) $f_{\mathsf{s}} = \lambda\mathfrak{A}\lambda c.\ c'$ **such that** c' **differs from** c **only in the following components**

$$\mathfrak{T}_{c'} = \mathfrak{T}_c \cdot \left\{ \begin{array}{l} \mathsf{S\text{-}Set}(\mathfrak{A})(\mathsf{s}_c)(c), \\ \mathsf{F\text{-}Set}(\mathfrak{A})(\mathsf{s}_c)(c) \end{array} \right\} \qquad \text{Type: } (e\mathsf{t})\mathsf{t}$$

Such a polar question can be used for checking whether the speaker may felicitously perform an act or not. At first glance, this may seem like an odd polar question to ask, as a speaker most likely knows whether or not they may perform a sentence act. However, certain varieties of rising declaratives in English, namely, those used to raise a meta-linguistic issue, seem to have this flavor (see also Malamud & Stephenson 2015; Goodhue 2021). For example, a non-inquisitive rising declarative like *my name is Adam Smith?* can be interpreted as expressing the polar question: 'Can I assert that my name is Adam Smith or not in this context?'. Since a speaker can nearly always commit to their name, this generates an implicature about the appropriateness of using the assertion in the relevant context.

As far as we know, most previous studies, with the exception of Goodhue (2021), assume that inquisitive and assertive rising declaratives are entirely different beasts (Malamud & Stephenson 2015; Rudin 2018; Jeong 2018). This view leaves the common intonational pattern in these rising declaratives unexplained.[31] Our approach has the advantage of unifying these two types of rising declaratives in the same framework of sentence act anchoring but still allowing them to differ slightly to derive their distinct discourse effects.

Lastly, although we have only investigated force shift to polar questions, the space of anchoring functions allow the presence of anchoring functions that do not change the force type involved. For example, Davis (2011) proposes an anchoring function, based on the Japanese particle *yo*, that anchors a sentence act to all participants. We leave a more thorough exploration of anchoring functions in future research.

[30] Alternatively, the speaker parameter may still be present but it is just not used in anchoring the sentence act associated with the lower force. It may still be involved in signaling that the higher polar question act is performed by the speaker.

[31] That said, there is some initial evidence, from Jeong (2018), that inquisitve and non-inquisitive rising declaratives may have slightly different intonational patterns.

5 Conclusion

In this paper, we have investigated the phenomenon of force shift, where the simplex force associated with a clause type can be overridden to yield polar questions about the felicitous performance of the relevant sentence act by the addressee. Our investigation and formalization show that questions may be formed not only about propositional content, but also about force-bearing expressions.

These conclusions are supported by a compositional approach to force shift involving particle clusters in Cantonese. This approach advocates a division of labor between lower and and higher particles in the sentential force layer. The lower particles combine with propositional content to return unanchored context change potentials while higher particles combine with this potential to return sentence acts. With this compositional system we explain why a variety of types of forces can be transformed into a polar question with the help of the force-shifting particle *ho2* without suspending speaker attitudes. We argue that force shift is a special case of sentence act anchoring, which involves anchoring a sentence act to both the speaker and the addressee, but in distinct ways. In fact, given the type of these anchoring functions as functions from unanchored sentence acts $(e\mathsf{T})$ to anchored sentence acts T, where T is the type of contextual change potentials, it is a natural consequence that some of these anchoring functions lead to force shifts.

Conflict of interest
The authors have no conflict of Interest.

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