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On counterfactual attitudes: a case study of Taiwanese Southern Min

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Abstract

This paper investigates the syntactic and semantic properties of counterfactual attitude verbs in Taiwanese Southern Min, showing the differences between this type of attitude verbs and those discussed by Anand and Hacquard (2013). I propose that the semantics of counterfactual attitude verbs is composed of two components, a doxastic assertion and a counterfactual felicity condition, the former of which makes them pattern with representational attitude verbs (Bolinger 1968) whereas the latter differentiates them. This latter component is also responsible for the epistemic licensing behavior of counterfactual attitude verbs, that is, such attitude verbs allowing epistemic *necessity* but not *possibility* modals in their complement clauses. This paper contributes to the study of attitude verbs by singling out counterfactual attitudes from the representational category and motivating a finer-grained typology of attitudes based on the distributional facts concerning epistemic licensing.

1 Background

This work contributes to the study of attitude predicates by singling out counterfactual attitudes from the so-called “representational attitudes” (Bolinger 1968) and motivating a finer-grained typology of attitudes based on the distributional differences of epistemic modals. This type of attitude expresses the meaning that the attitude holder believes the embedded proposition to be true in the attitude world, but the proposition turns out to be false in the actual world. I call this type of attitude “counterfactual attitudes”. In this paper, I investigate the syntactic and semantic properties of counterfactual attitudes, focusing on 掠準 *liah8-tsun2* ‘to think (counterfactually)’ in Taiwanese Southern Min (hereafter, TSM) as a case study. TSM has several counterfactual attitude verbs, such as 掠準 *liah8-tsun2*, 掠做 *liah8-tso3*, and 叫是 *kio3-si7*, and speakers of different varieties of TSM may have different choices of verbs as their vocabulary for counterfactual attitude. These three verbs all have similar behavior, as exemplified by 1–3 below. Most of the TSM data used for illustration are extracted from Taiwanese television dramas and folk stories^a and Taiwanese Concordancer (Iunn5, Un2-gian5 楊允言 2003). This latter corpus includes more than 3,000,000 words, collected from vernacular texts composed by various authors. In addition to these corpora, some of the examples are produced in an introspective way based on grammaticality judgments of native speakers.

- (1) 我掠準你咧睏。(Iunn5, Un2-gian5 楊允言 2003: 37)
 gua2__liah8-tsun2__li2__teh4__khun3^b.
 I__think__you__PRG__sleep
I thought that you were sleeping.
- (2) 眾人掠做Ali已經死啊,是伊个鬼魂轉來。(Iunn5, Un2-gian5 楊允言 2003: 99)
 tsing3-lang5__liah8-tso3__Ali__i2-king1__si2__ah4,__si7__i1-e5__kui2-
 hun5__tng2-lai5.
 Everyone__think__Ali__already__die__PRT__COP__his__ghost__return
Everyone thought that Ali was dead and that it was his ghost that returned.
- (3) 我叫是這會當趁錢。(TSHK 3, 02:18)
 gua2__kio3-si7__tse1__e7-tang2__than3-tsinn5.
 I__think__this__can__make.money
I thought that this could make money.

The reason I choose *liah8-tsun2* as the case study is that though it may not be commonly used in some varieties of TSM, only *liah8-tsun2* is used exclusively as a counterfactual attitude verb, while the other two verbs can have other uses. For example, *liah8-tso3* can mean that A is considered or regarded as B, as shown in 4, which is an Exceptional Case Marking (ECM) usage, having nothing to do with counterfactuality.

- (4) 除了死以外,世間無一項予我掠做有趣味。(Iunn5, Un2-gian5 楊允言 2003: 17)
 tu5-liau2__si2__i2-gua7,__se3-kan1__bo5__tsit4-hang7__hoo7__gua2__liah8-
 tso3__u7__tshu3-bi7.
 Except__death__except__world__NEG.have__one-
 CL__let__me__consider__have__interest
Except for death, I consider nothing in the world interesting.

In the following discussion, I will take *liah8-tsun2* as an example to demonstrate the syntactic and semantic properties of counterfactual attitude verbs in TSM, and to show the important differences of counterfactual attitudes from other types of attitudes, with a special focus on a distributional puzzle—the licensing behavior of epistemic modals. This distributional puzzle will be the main issue of this paper. I will first demonstrate the empirical fact that counterfactual attitudes allow epistemic *necessity* but not *possibility* modals in their complement clauses, and then provide a semantic account for this fact.

This paper is structured as follows. In Section 2, I give a brief review of the literature on attitudes and epistemics, with a special emphasis on Anand and Hacquard's (2013) study. Section 3 presents the syntactic and semantic properties of counterfactual attitudes in TSM and the distribution of epistemic modals in this attitudinal context. In Section 4, I present the semantics of counterfactual attitudes, based on which the distributional fact is accounted for. In addition, I adopt the analysis advocated by Veltman (1996), Hacquard (2006, 2010), and Yalcin (2007) that embedded epistemic modals

obtain their modal bases via anaphoric reference. My analysis is sketched in the following lines: counterfactual attitudes provide an information state that epistemic modals can be anaphoric to, thereby licensing epistemic modals; however, the counterfactual component in the semantics of such attitudes, as a felicity condition, filters out epistemic possibility modals, since the resulting existential quantification over the information state via semantic composition of the modals and the embedding attitude implies that the domain of quantification is not totally excluded from the set of “common ground” worlds that contain all background information established in the actual world (see Stalnaker 1970, 2002 for the notion of common ground). This leads to violation of the felicity condition. Therefore, epistemic possibility modals cannot be licensed in this attitudinal context. I conclude this paper in Section 5.

2 Review of the literature on attitudes and epistemics

2.1 Two types of attitudes

Standard Hintikka semantics (Hintikka 1969) treats all attitude verbs as universal quantifiers over possible worlds. However, this uniform treatment has been argued in recent work on attitudes to fail to predict any major linguistic differences between classes of attitude verbs, say, attitudes of belief and attitudes of desire (e.g., Farkas 1992; Moltmann 2003; Laca 2013; Anand and Hacquard 2013). The two classes of attitude verbs do show important differences with respect to their diverse complementation behavior, for example, mood choice and temporal orientation of their complement clauses.

Among others, Anand and Hacquard (2013) focus on a distributional difference between attitudes of belief or “attitudes of acceptance” in Stalnaker’s (1984) term and attitudes of desire or command. They distinguish the former class of attitude verbs from the latter in terms of their licensing behavior of epistemic modals. As the examples 5 and 6 illustrate, attitudes of acceptance including doxastics, semifactives, and verbs of argumentation allow for epistemic interpretations of modals in their complement clauses while attitudes of desire or command do not.

- (5)a. John thinks that Mary has to be innocent.
 b. Mary believes that John might be running late.
 c. John discovered that Mary had to be the murderer.
 d. Mary claims that John might come to the party.
- (6)a. #John wants Mary to have to be the murderer.
 b. #Mary demanded that John might be running late.
 c. #Mary requests that John might come to the party.

Anand and Hacquard (2013) argue that this distributional puzzle is due to a substantive difference between the two types of attitude verbs—representationality. According to them, attitudes of acceptance are “representational” (Bolinger 1968) in that this type of attitude verb describes the content of a propositionally consistent attitudinal state. The semantics of representational attitude verbs they propose is given in 7, and I take the verb *believe* for illustration here.

(7) For any attitude *att*,

$[[att \phi]]^{c,w,S,g} = \lambda x. \forall w' \in S': [[[\phi]]^{c,w',S',g} = 1]$, where S' is the quantificational domain provided by *att*.

$\rightarrow [[believe \phi]]^{c,w,S,g} = \lambda x. \forall w' \in S': [[[\phi]]^{c,w',S',g} = 1]$, where $S' = DOX_{x,w}$

(In all worlds w' compatible with the attitude holder x 's beliefs in w , ϕ is true in w' .)

(Anand and Hacquard 2013: 8-16 and 8-21)

On the other hand, attitudes of desire or command are non-representational. They do not provide an information state, but have a comparative semantics, combining with their complement proposition by comparing it to contextual alternatives. Thus, they invoke ordering between alternatives (Bolinger 1968; Stalnaker 1984; Heim 1992; Farkas 2003; Villalta 2000, 2008). Anand and Hacquard (2013) call this type of attitude verbs “preference-oriented attitudes.” The semantics of non-representational attitudes is presented in 8, in which the volitional bouletic verb *want* is taken as the example. To capture the inability of non-representational attitudes to provide an information state, the relevant parameter is set to the empty set \emptyset , as shown in 8.

(8) $[[want \phi]]^{c,w,S,g} = \lambda x. \lambda w'. [[[\phi]]^{c,w',\emptyset,g} >_{DES_{x,w}} \lambda w'. \neg [[[\phi]]^{c,w',\emptyset,g}$

(ϕ is more desirable to the attitude holder x in w than $\neg\phi$.)

(Anand and Hacquard 2013: 8–21)

Based on this fundamental split in the semantics of attitude verbs, Anand and Hacquard (2013) derive the generalization in 9 to capture the pattern exemplified in 5 and 6.

(9) Epistemic Licensing Generalization (Anand and Hacquard 2013: 8–3)

Epistemic modals are licensed only in representational attitudes.

To account for this empirical fact, Anand and Hacquard (2013) also adopt the proposal from the literature on epistemic modality (Veltman 1996; Hacquard 2006, 2010; Yalcin 2007) that the embedded epistemic modals need to be evaluated relative to an appropriate information state, which is accessible when they are embedded under representational attitude verbs. Since embedded epistemic modals retrieve a quantificational domain from the embedding attitude, they are licensed only in the attitudes that can provide an information state, namely the representational ones. Non-representational attitudes do not provide an information state; therefore, they do not allow for epistemic interpretations of embedded modals.

2.2 The third type of attitude

In view of this sensitivity of epistemic modals to the attitude type, Anand and Hacquard (2013) argue that in addition to representational and non-representational attitudes, there is a third type of attitude, which has a hybrid semantics, containing both a doxastic component and an ordering component. Such attitudes include emotive doxastics (*hope, fear*) and dubitatives (*doubt*). They share properties with both representational and preference-oriented attitudes.

This type of attitude patterns with representational attitudes in many aspects (see Scheffler 2008, Anand and Hacquard 2013 for more details); it asserts that the pre-jacent proposition is a doxastic possibility and meanwhile requires the other alternatives to be also possible. The following examples show the contrast between emotive doxastics (e.g. *hope*) and desideratives (e.g. *want*), in which *hope p* is infelicitous with an assertion of the certainty of *p* (or *not p*) since it requires relevant alternative propositions to be doxastic possibilities and thus conveys uncertainty about *p*'s truth, while *want* imposes no such constraint but merely conveys the preferences of the attitude holder.

(10) It is raining. (Scheffler 2008)

- a. # I hope it is raining.
- b. √ I want it to be raining.

(11) It isn't raining. (Scheffler 2008)

- a. # I hope it is raining.
- b. √ I want it to be raining.

The fact that this third type of attitude conveys a doxastic assertion suggests that it describes an information state which supplies a modal base to embedded epistemic modals. Therefore, epistemic modals are expected to be licensed by this type of attitude. As the examples 12–16 show, however, only epistemic possibility modals are good in this attitudinal context. The first three of these examples illustrate the case of emotive doxastics, and the last two the case of dubitatives, all of which are taken from Anand and Hacquard's (2013: 8–10 and 8–34) study.

(12) John hopes that it might be raining.

(13) Jean_craint_que_Marie_puisse_avoir_connu_son_tueur.
 Jean_fears_that_Marie_can-SUBJ_have_known_her_killer
John fears that Mary may have known her killer.

(14) #Jean_craint_que_Marie_doive_avoir_connu_son_tueur.
 Jean_fears_that_Marie_must-SUBJ_have_known_her_killer
#John fears that Mary must have known her killer.

(15) Jean_doute_que_Marie_puisse_avoir_connu_son_tueur.
 Jean_doubts_that_Marie_can-SUBJ_have_known_her_killer
John doubts that Mary may have known her killer.

(16) #Jean_doute_que_Marie_doive_avoir_connu_son_tueur.
 Jean_doubts_that_Marie_must-SUBJ_have_known_her_killer
#John doubts that Mary must have known her killer.

What rules out epistemic necessity modals, as Anand and Hacquard (2013) point out, will be an incompatibility between the certainty of such modals and the uncertainty about the truth of the pre-jacent proposition, which is brought forth due to the

inference that all relevant alternatives are doxastic possibilities. Anand and Hacquard argue that the semantics of this type of attitude also contains a preference component, in addition to the representational component. What the preference component is taken to do here is “express the attitude holder’s preference for how this uncertainty gets resolved” (2013: 8–28). This meaning component serves to indicate a preference between various subsets of the attitude holder’s doxastic state. For example, if John hopes that it is raining, he is uncertain about whether it is raining or not, but his preference is shown to be in favor of rain. That is, John prefers the subset of his doxastic state in which it is raining over that in which it is not.

The following examples, from Anand and Hacquard (2013: 8–34 and 8–36), concretely illustrate the hybrid semantics of emotive doxastics (e.g. *hope*) and dubitatives (e.g. *doubt*) with epistemic *might*, which is composed of three components—an uncertainty felicity condition, an existential doxastic assertion, and a preference assertion.

(17) John hopes that it might be raining.

Uncertainty: There is a non-trivial subset of John’s belief worlds where it is raining and a non-trivial subset where it is not raining.

Doxastic: There is a world compatible with John’s beliefs where it is raining.

Preference: Rain is more desirable to John than no rain.

(18) John doubts that it might be raining.

Uncertainty: There is a non-trivial subset of John’s belief worlds where it is raining and a non-trivial subset where it is not raining.

Doxastic: There is a world compatible with John’s beliefs where it is raining.

Preference: No rain is more likely to John than rain.

2.3 The fourth typological possibility

Anand and Hacquard’s (2013) typology of attitudes is based on the semantics of the verbs determined by two meaning components—a representational component and a preference component. Those with a representational component are representational attitudes, those with a preference component are non-representational attitudes, and emotive doxastics and dubitatives have a hybrid semantics, constituting the third type. However, if we consider these three types of attitudes from another angle, viz. the interaction between the embedding attitude verbs and the embedded epistemic modals, we may ask whether a fourth typological possibility exists, as Table 1 shows: could there be a fourth class of attitude verbs, which allows epistemic necessity but not possibility modals in their complement clauses?

Table 1 A typology of epistemic licensing in attitudes

Epistemic licensing	Attitude type
Necessity \wedge possibility	Representational attitudes
Necessity	??
Possibility	Hybrid attitudes
None	Non-representational attitudes

In what follows, I will show that the fourth typological possibility does exist. This is the case for counterfactual attitudes, which are not taken into account by Anand and Hacquard (2013), and will be discussed in the remainder of the paper.

3 Counterfactual attitudes in TSM

In this section, I introduce the syntactic and semantic properties of counterfactual attitudes in TSM and the distribution of epistemic modals in this attitudinal context. Based on these facts, I argue that counterfactual attitude verbs should be singled out from the representational category as the fourth type of attitude verb.

3.1 Representationality

I take *liah8-tsun2* as an example to show the syntactic and semantic properties of counterfactual attitude verbs in TSM. This type of attitude expresses the meaning that the attitude holder believes the embedded proposition to be true in the attitude world, but the proposition turns out to be false in the actual world. This is illustrated by 19–22. Note that the continuations in 20–22 make it clear that the propositions embedded under *liah8-tsun2* are judged false in the actual world.

(19) 你若第一擺看著伊，穩當會掠準伊是番仔。(Iunn5, Un2-gian5 楊允言 2003: 45)

li2_na7_te7-it4-pai2_khuann3-tioh8_i1,_un2-tang3_e7_liah8-tsun2_i1_si7_huan1-a2.

You_if_first_see_him_definitely_will_think_he_COP_aborigine
At first sight, you would definitely think that he was an aborigine.

(20) 大部份的人攞掠準英語是美國的官方語言。其實，美國並無... (Iunn5, Un2-gian5 楊允言 2003: 66)

tai7-poo7-hun7_e5_lang5_long2_liah8-tsun2_ing1-gi2_si7_bi2-kok4_e5_kuann1-hong1_gi2-gian5_ki5-sit8,_bi2-kok4_ping7_bo5...

Most_MOD_person_all_think_English_COP_America
MOD_official_language_actually_America_RETORT_NEG
Most people thought that English was the official language of America. Actually, America does not ...

(21) 你掠準我會流目屎是無? 袂! 我袂! (Iunn5, Un2-gian5 楊允言 2003: 5)

li2_liah8-tsun2_gua2_e7_lau5_bak8-sai2_si7_bo5?_bue7!_gua2_bue7.

You_think_I_will_shed_tear_COP_NEG_won't_I_won't
You thought that I would shed tears, didn't you? No, I won't.

(22) 因掠準我驚鋤頭，其實我驚个是劍。(Iunn5, Un2-gian5 楊允言 2003: 24)

in1_liah8-tsun2_gua2_kiann1_ti5-thau5,_ki5-sit8_gua2_kiann1_e5_si7_kiam3.

They_think_I_fear_hoe_actually_I_fear_MOD_COP_sword
They thought that I feared a hoe; actually, what I feared is a sword.

Since counterfactual attitude verbs quantify over a set of doxastic worlds, they denote representational attitudes. Scheffler (2008) points out that an attitude verb which has a

representational doxastic component can be used to felicitously respond to a question while desideratives and directives, which have a preference component and are non-representational, may not. The dialog below from Scheffler (2008) illustrates the contrast between *hope* and *want*, namely the contrast with and without a representational component. In 23, B's answer with *hope* is felicitous, unlike that with *want*. Scheffler argues that B's assertion of *hope p* entails that *p* is a possibility, hence providing a partial answer to A's question.

(23) A: Kommt Peter heute? (Scheffler 2008)

Is Peter coming today?

B: Ich hoffe/*will, dass er heute kommt.

I hope/*want that he is coming today.

This diagnostic test is applied to *liah8-tsun2*, as illustrated by 24, which shows that *liah8-tsun2* is an attitude verb with a representational component. In 24, B asserts with *liah8-tsun2 (p)* that *p* holds in his belief world. This felicitously responds to A's question as a partial answer. On the contrary, C's answer with *want* or *command* is not a felicitous response here.

(24) A: 阿明今仔日敢會來?

A: a1-bing5_kin1-a2-jit8_kam2_e7_lai5?

A: A-bing_today_Q_will_come

A: *Will A-bing come today?*

B: 袂! 我掠準伊會來, 結果伊講伊袂當來。

B: bue7!_gua2_liah8-tsun2_i1_e7_lai5,_kiat4-ko2_i1_kong2_i1_bue7-tang3_lai5.

B: Won't_I_think_he_will_come_as.a.result_he_say_he_cannot_come

B: *No, he won't. I thought he would come, but he said that he couldn't make it.*

C: #我(想)欲/命令伊來。

C: #gua2_(siunn7-)beh4/bing7-ling7_i1_lai5.

C: I_want/command_he_come

C: *#I want/command him to come.*

Further evidence showing that *liah8-tsun2* patterns with representational attitudes comes from the fact that attitudes of desire can be modified by degree modifiers while attitudes of acceptance cannot (cf. Villalta 2006). This is exemplified by 25 and 26.

(25) a. What I want the most is for Mary to leave.

b. *What I believe the most is that Mary left.

(26) a. 我真想欲伊來。

gua2_tsin1_siunn7-beh4_i1_lai5.

I_very_want_he_come

I want him to come very much.

- b. *我真掠準伊會來。
 *gua2__tsin1__liah8-tsun2__i1__e7__lai5.
 I__very__think__he__will__come
 *I thought very much that he would come.

The empirical data given above attest that counterfactual attitudes like *liah8-tsun2* are representational.

3.2 Indicative-selecting, yet having no parenthetical uses

Previous studies on mood and attitudes have arrived at a consensus that indicative-selecting attitudes require commitment to truth of the embedded proposition by the attitude holder while subjunctive-selecting attitudes lack a notion of commitment but express preferences (Bolinger 1968; Farkas 1992, 2003; Portner 1997; Villalta 2000, 2008). In view of these semantic differences reflected via mood selection, *liah8-tsun2* and the other counterfactual attitude verbs in TSM are obviously indicative-selecting attitudes. They embed complement clauses with indicative mood, describing a mistaken judgment of truth by the attitude holder.

In addition, as shown in the above examples, all the subjects of the sentences containing *liah8-tsun2* are animate. This is undoubtedly because the attitude holder of this verb type can only be a human being. We can also see from examples 19–22 that the attitude holder of *liah8-tsun2* is not restricted to the speaker only. The fact that the grammatical subjects of such sentences cannot be inanimate suggests that *liah8-tsun2* is not dislocatable. Thus, it does not have a “slifting” (Ross 1973) or raising structure as some other representational attitude verbs such as *think* in English and 拍算 *phah4-sng3* ‘to think’ in TSM (Hsiao 2013) do.

The example 27 shows that the attitude verb *phah4-sng3* in TSM can have a slifting or raising structure. In 27, the grammatical subject of the sentence is inanimate, which is actually selected by the predicate in the complement clause rather than *phah4-sng3*.

- (27) 明仔載拍算會落雨。
 bin5-a2-tsai3__phah4-sng3__e7__loh8-hoo7.
 Tomorrow__think__will__rain
 It will rain tomorrow, I think.

Phah4-sng3 in this case functions as an evidential marker, expressing the speaker’s attitude toward the proposition it modifies, that is, the modified proposition being epistemically possible (see Hsiao 2013 for more discussion on *phah4-sng3*). Similarly, *think* in English also shows positional mobility, which is characteristic of a slifting phrase, as illustrated by 28. It has been argued in literature (e.g., Thompson and Mulac 1991) that (*I think*) has undergone grammaticalization and been reanalyzed as an epistemic adverb or an evidential marker.

- (28) a. I think John is home.
 b. John is home, I think.
 c. John, I think, is home.

Such positional mobility, however, cannot be found in the case of counterfactual attitude verbs in question; see example 29.

- (29) a. 我掠準阿明佇厝裏咧睏。
 gua2__liah8-tsun2__a1-bing5__ti7__tshu3-li2__teh4__khun3.
 I__think__A-bing__at__house-inside__PRG__sleep
I thought that A-bing was sleeping at home.
- b. *阿明佇厝裏咧睏, 我掠準。
 *a1-bing5__ti7__tshu3-li2__teh4__khun3,__gua2__liah8-tsun2.
 A-bing__at__house-inside__PRG__sleep__I__think
 *A-bing was sleeping at home, I thought.

Nor do the counterfactual attitude verbs have the so-called “parenthetical uses” (Urmson 1952). Parenthetical uses refer to a discourse property of the embedding verbs. That is, the verbs that exhibit parenthetical uses do not constitute the main point of an utterance, but serve discourse functions like evidentiality, though syntactically they remain in the same position as an ordinary embedding verb. Authors of many studies have argued that representational attitude verbs can exhibit parenthetical uses (e.g., Urmson 1952; Hooper 1975; Simons 2007). The following examples cited from Simons (2007: 1036) illustrate that different utterances of the same sentence can have different main points. In 30, the response a is the direct answer to A’s question, and the responses b–j are different ways of delivering the same answer, that is, the content of the embedded clause. In these cases, the embedded clause carries the main point of the utterance, and the embedding attitude verb functions as an evidential marker, conveying the information about the source of the claim, or the reliability or probability of the claim. On the other hand, in other contexts like that shown in 31, the attitude verb takes the main point status.

- (30) A: Who was Louise with last night?
 B: a. She was with Bill.
 b. Henry thinks/I think that she was with Bill.
 c. Henry believes/I believe that she was with Bill.
 d. Henry said that she was with Bill.
 e. Henry suggested that she was with Bill.
 f. Henry hinted that she was with Bill.
 g. Henry imagines/I imagine that she was with Bill.
 h. Henry supposes/I suppose that she was with Bill.
 i. Henry heard/I heard that she was with Bill.
 j. Henry is convinced/I’m convinced that she was with Bill.

- (31) A: What is bothering Henry?
 B: He thinks that Louise was with Bill last night.

What 30 indicates is that representational attitudes have parenthetical uses. However, the same situation cannot be found in cases involving a counterfactual

attitude verb. That is, counterfactual attitudes do not have parenthetical uses even though they are also representational attitudes; they always take the main point status in utterances. Consider the following examples. It is evident that the response 32b is not an appropriate answer to A's question, unlike the corresponding cases shown in 30. The inappropriateness of a sentence with an embedding counterfactual attitude verb as the answer to such a question given in 32 suggests that counterfactual attitudes do contribute to the at-issue content of the utterance, as 33 shows.

(32) A: 阿英昨昏佢人做伙?

a1-ing1__tsa1-hng1__kah4__siang5__tso3-hue2?

A-ing__yesterday__with__who__be.together

Who was A-ing with yesterday?

B: a. 伊佢王先生做伙。

i1__kah4__ong5-sian1-sinn1__tso3-hue2.

She__with__Wang-Mr.__be.together

She was with Mr. Wang.

b. #阿明/我掠準伊佢王先生做伙。

#a1-bing5/gua2__liah8-tsun2__i1__kah4__ong5-sian1-sinn1__tso³-hue².

A-bing/I__think__she__with__Wang-Mr.__be.together

#A-bing/I thought that she was with Mr. Wang.

(33) A: 阿明是咧煩惱啥?

a1-bing5__si7__teh4__huan5-lo2__siann2?

A-bing__COP__PRG__bother__what

What is bothering A-bing?

B: 伊掠準阿英昨昏佢王先生做伙。

i1__liah8-tsun2__a1-ing1__tsa1-hng1__kah4__ong5-sian1-sinn1__tso3-hue2.

He__think__A-ing__yesterday__with__Wang-Mr.__be.together

He thought that A-ing was with Mr. Wang yesterday.

3.3 Unnegatability

Another property that distinguishes counterfactual attitudes from other representational attitudes is their unnegatability. The following examples illustrate that counterfactual attitude verbs such as *liah8-tsun2* cannot be negated, as shown in 34, while other representational attitude verbs can. Examples 35 and 36 are exemplification of doxastic verbs, 37 of semi-factive verbs, and 38 of verbs of argumentation. I argue that the contrast between 34 and 35–38 can be attributed to the semantics of counterfactual attitudes, which involves a counterfactual component. In the next subsection, I will show that this counterfactual component stands as a presupposition.

(34) a. *伊無掠準阿英昨昏佢王先生做伙。

*i1__bo5__liah8-tsun2__a1-ing1__tsa1-hng1__kah4__ong5-sian1-sinn1__tso3-hue2.

He__NEG__think__A-ing__yesterday__with__Wang-Mr.__be.together

He didn't mistakenly think that A-ing was with Mr. Wang yesterday.

- b. 伊掠準阿英昨昏無佢王先生做伙。
 i1_liah8-tsun2_a1-ing1_tsa1-hng1_bo5_kah4_ong5-sian1-sinn1_tso3-hue2.
 He_think_A-ing_yesterday_NEG_with_Wang-Mr._be.together
He thought that A-ing was not with Mr. Wang yesterday.
- (35) a. 我無認為伊今仔日會來。
 gua2_bo5_jin7-ui5_i1_kin1-a2-jit8_e7_lai5.
 I_NEG_think_he_today_will_come
I don't think that he will come today.
- b. 我認為伊今仔日袂來。
 gua2_jin7-ui5_i1_kin1-a2-jit8_bue7_lai5.
 I_think_he_today_won't_come
I think that he won't come today.
- (36) a. 我毋相信伊佢王先生做伙。
 gua2_m7_siong1-sin3_i1_kah4_ong5-sian1-sinn1_tso3-hue2.
 I_NEG_believe_she_with_Wang-Mr._be.together
I don't believe that she is with Mr. Wang.
- b. 我相信伊無佢王先生做伙。
 gua2_siong1-sin3_i1_bo5_kah4_ong5-sian1-sinn1_tso3-hue2.
 I_believe_she_NEG_with_Wang-Mr._be.together
I believe that she is not with Mr. Wang.
- (37) a. 我無發覺伊有寫作个才能。
 gua2_bo5_huat4-kak4_i1_u7_sia2-tsok4_e5_tsai5-ling5.
 I_NEG_discover_he_have_writing_MOD_talent
I didn't discover that he has a talent for writing.
- b. 我發覺伊無寫作个才能。(Iunn5, Un2-gian5 楊允言 2003: 14)
 gua2_huat4-kak4_i1_bo5_sia2-tsok4_e5_tsai5-ling5.
 I_discover_he_NEG.have_writing_MOD_talent
I discovered that he has no talent for writing.
- (38) a. 因無講阿婆是台北人。
 in1_bo5_kong2_a1-po5_si7_tai5-pak4_lang5.
 They_NEG_say_old.woman_COP_Taipei_person
They didn't say that the old woman is from Taipei.
- b. 因講阿婆毋是台北人。
 in1_kong2_a1-po5_m7_si7_tai5-pak4_lang5.
 They_say_old.woman_NEG_COP_Taipei_person
They said the old woman is not from Taipei.

3.4 Counterfactual presupposition

The counterfactual interpretation of *liah8-tsun2* and its kin is derived as a presupposition, rather than a conversational implicature, since it is indefeasible. The following examples illustrate this. In 39 and 40, the *b* sentence cannot be a felicitous continuation of the *a* sentence with *liah8-tsun2* in that the attitude holder, namely

the speaker in these two cases, knows that her belief in p (the prejacent proposition) is a mistaken thought, and that $\neg p$ is the fact, and therefore, the assertion of p in 39b and 40b contradicts her understanding. The counterfactual interpretation of the a sentence in 39 and 40 cannot be canceled. Note that what is presupposed in the cases under discussion is not p (the prejacent proposition) per se, but the negation of p (the background proposition). Take 39 for example. Since $\neg p$ is the assumed background, namely that the individual in question is not an aborigine, the following assertion of p that the individual is an aborigine in 39b would result in a contradiction with the assumed background. On the contrary, the assertion of $\neg p$ in 39c makes the background assumption articulated. The infelicity of 39b therefore shows that the presupposition cannot be canceled.

(39) a. 我掠準伊是番仔。

gua2_liah8-tsun2_i1_si7_huan1-a2.

I_think_he_COP_aborigine

I thought that he was an aborigine.

b. #其實伊就是。

#ki5-sit8_i1_to7_si7.

Actually_he_exactly_COP

Actually, he is.

c. 其實伊毋是。

ki5-sit8_i1_m7_si7.

Actually_he_NEG_COP

Actually, he is not.

(40) a. 我掠準伊昨昏會來。

gua2_liah8-tsun2_i1_tsa1-hng1_e7_lai5.

I_think_he_yesterday_will_come

I thought he would come yesterday.

b. #結果伊昨昏真正有來。

#kiat4-ko2_i1_tsa1-hng1_tsin1-tsiann3_u7_lai5.

As.a.result_he_yesterday_really_ASP_come

As a result, he really came yesterday.

c. 結果伊昨昏無來。

kiat4-ko2_i1_tsa1-hng1_bo5_lai5.

As.a.result_he_yesterday_NEG_come

As a result, he didn't come yesterday.

The following example might suggest that the counterfactuality of *liah8-tsun2* is cancellable^c:

(41) 我掠準伊是番仔。想袂到,伊誠實是!

gua2_liah8-tsun2_i1_si7_huan1-a2._siong2-be7-kau3,_i1_tsiann5-sit8_si7!

I_think_he_COP_aborigine_to.one's.surprise_he_truly_COP

I thought that he was an aborigine; to my surprise, he really is.

However, 41 is not a real counter-example to my claim. In 41, the phrase 想袂到 *siong2-be7-kau3* ‘to one’s surprise’ is involved, which not only indicates that the following assertion of p (i.e., the individual is an aborigine) is surprising to the speaker, but also encodes a “downdate” (McCready 2005) of $\neg p$ that is assumed in the information state (i.e., the common ground), which p is subsequently used to update. The downdate and update operations change the original context into a new one. This kind of cancelation is different from the cancelability of conversational implicatures. It is not that the presupposition is waived or weakened, but that the discourse context is changed. Cases such as 41 can be dealt with in a dynamic semantic framework (see, for example, Heim 1992).

The counterfactual presuppositions in sentences with *liah8-tsun2* can be further detected by the wait-a-minute test developed and popularized by von (see also Matthewson 2006; Singh 2007). This test is proposed to separate presuppositions from assertions. It works for presuppositions but not for assertions, which are not in the common ground at the time of utterance. If a presupposition P is not in the common ground at the time of utterance, the hearer can legitimately challenge the speaker by using “Hey, wait a minute! I didn’t know P .” In contrast, an assertion cannot be challenged in this way. This is illustrated by the example in 42, which is taken from von. The presupposition involved in 42 is the existence presupposition of *the*.

(42) A: The mathematician who proved Goldbach’s Conjecture is a woman.

B: Hey, wait a minute. I had no idea that someone proved Goldbach’s Conjecture.

B’: #Hey, wait a minute. I had no idea that that was a woman.

The application of the wait-a-minute test to the case of *liah8-tsun2* is as follows. Suppose a scenario like 43.

(43) Scenario:

The speaker is a sales representative of the company A, and he planned to visit the company B for business purposes. Before he went to the company B, he happened to learn the name of the company B’s representative. He thought that the representative of the company B was a man by judging the name. However, he realized that he had made a mistake when he met the representative of the company B. After he came back, he told the hearer that:

Speaker: 我拄才去彼間公司拜訪;

gua2__tu2-tsia4__khi3__hit4-king1__kong1-si1__pai3-hong2;

I_a.while.ago__go__that-CL__company__visit

I visited that company a while ago;

我掠準因公司个業務代表是查埔个講。

gua2__liah8-tsun2__in1__kong1-si1__e5__giap8-bu7__tai7-piau2__si7__tsa1-poo1-e5__kong2.

I__think__they__company__MOD__sales__representative__COP__man__say

I’m telling you, I thought that the sales representative of the company was a man.

- Hearer: a. 小等咧,我毋知影伊是查某个。
 sio2-tan2-leh4,_gua2_m7_tsail-iann2_i1_si7_tsa1-boo2-e5.
 Wait.a.minute_I_NEG_know_she_COP_woman
Hey, wait a minute! I didn't know the representative is a woman.
- b. #小等咧, 我毋知影你拄才去因公司。
 #sio2-tan2-leh4,_gua2_m7_tsail-iann2_li2_tu2-
 tsiah4_khi3_in1_kong1-sil.
 Wait.a.minute_I_NEG_know_you_a.while.ago_go_they_
 company
#Hey, wait a minute! I didn't know you went to their company a while ago.

The felicity of the hearer's response in 43a to the speaker's utterance indicates that the speaker presupposed $\neg p$ (the representative is a woman) when he uttered the sentence containing *liah8-tsun2* and took it for granted that $\neg p$ is already shared information among the participants in the conversation, so the hearer made a complaint about the presupposition when it was not in fact established in his own information state prior to the speaker's utterance. An asserted, non-presuppositional part of the speaker's utterance, on the other hand, cannot be challenged in the same way, as shown in the hearer's illegitimate response in 43b.

A potential challenge for the feasibility of the wait-a-minute test is the example 44^d. One might think that the wait-a-minute test does not work only for presuppositions, since the clausal complement of a non-factive attitude verb like 相信 *xiangxin* 'believe' is not considered as a presupposition but the test works for it.

- (44) A: 我相信張三解決了那個很難的問題。
 wo_xiangxin_zhangsan_jiejue-le_na-ge_hen_nan_de_wenti.
 I_believe_Zhangsan_solve-ASP_that-CL_very_difficult_MOD_problem
I believe that Zhangsan solved that difficult problem.
- B: 等一下! 我不知道有人解決了那個問題啊!
 deng-yixia!_wo_bu_zhidao_you_ren_jiejue-le_na-ge_wenti_a!
 Wait-in.a.short.while_I_NEG_know_have_person_solve-ASP_that-
 CL_problem_PRT
Hey, wait a minute! I didn't know there was a person who solved that problem.

However, this example does not really post a problem, because the A sentence in 44 indeed involves presuppositions triggered by the proper name 張三 *Zhangsan* and the definite description 那個很難的問題 *na-ge hen nan de wenti* 'that difficult problem'.

It has been argued in studies conducted within the framework of dynamic semantics (e.g., Geurts 1997; Maier 2007) that definite descriptions and proper names are presupposition inducers, which trigger the presupposition that the referent is existent and unique. Moreover, Geurts (1998) also argues that the verb *believe* triggers a certain presupposition. According to him, presuppositions that are triggered in the scope of *believe* may give rise to two-sided readings, which are internal and external respectively. Consider 45, from Geurts (1998: 551).

(45) Louise believes that her niece lives in Leeds.

In 45, the attitude verb *believe* embeds a clause where the presupposition is triggered by the definite description *her niece* that Louise has a niece. This presupposition is construed externally as not being part of the attitude report. Besides, the internal construal of a presupposition associated with 45 is that Louise believes that she has a niece (see also Karttunen 1974 and Heim 1992). Such two-sided readings can be traced to the definite description *her niece*, and thus are presuppositional in nature, which usually come along with attitude ascriptions like 45.

In view of the above discussion, it is clear that in 44, the complement of *xiangxin* involves the presuppositions that there exists a unique person whose name is *Zhangsan* and that there is a difficult problem, which are triggered by the proper name and the definite description. The sentence as a whole also presupposes that the attitude holder, the speaker in this case, believes that there is a unique person whose name is *Zhangsan* and there is a difficult problem to be solved. The utterance of the speaker A in 44 yields two-sided presuppositional interpretations, and accordingly, the challenge of the hearer B by “Hey, wait a minute!” is legitimate. The test is valid.

In addition to the wait-a-minute test, another test provided by can also be used to detect presuppositions. Consider the following sentences, cited from Singh (2007: 1). The sentence in 48 can be concluded from both 46 and 47, but from 46 by entailment and from 47 via presupposition.

(46) John has a German shepherd.

(47) John’s dog likes to play.

(48) John has a dog.

According to, if a sentence is concluded as a presupposition, then it is odd to explicitly assert ignorance about it and go on to presuppose it. The contrast between 49 and 50 demonstrates this effect.

(49) I don’t know whether John has a dog or not, but if he has a German shepherd, I will invite him to the party.

(50) #I don’t know whether John has a dog or not, but if his dog likes to play, I will invite him to the party.

This test is also applicable to counterfactual attitudes in TSM. The test result supports my claim that the counterfactual interpretation is a presupposition. See the contrast between 51 and 52.

(51) #我毋知影伊是查埔个抑是查某个, 我掠準伊是查埔个。

#gua2_m7_tsai1-iann2_i1_si7_tsa1-poo1-e5_iah8-si7_tsa1-boo2-e5,_gua2_liah8-tsun2_i1_si7_tsa1-poo1-e5.

I_NEG_know_s/he_COP_man_or_woman_I_think_s/he_COP_man

#I don’t know whether the guy is a man or a woman; I thought that the guy was a man.

(52) 我毋知影伊是查埔个抑是查某个, 但是我認為伊是查埔个。

gua2__m7__tsai1-iann2__i1__si7__tsa1-poo1-e5__iah8-si7__tsa1-boo2-e5,__tan7-si7__gua2__jin7-ui5__i1__si7__tsa1-poo1-e5.

I__NEG__know__s/he__COP__man__or__woman__but__I__think__s/
he__COP__man

I don't know whether the guy is a man or a woman, but (based on some evidence or observations,) I think that the guy is a man.

When the counterfactual attitude verb *liah8-tsun2* in 51 is replaced by its non-presuppositional counterpart, 認為 *jin7-ui5* 'think', the resulting sentence becomes felicitous, as 52 illustrates. The second conjunct in 52 does not carry a presupposition that the person is a female, but only indicates the speaker's belief in the gender of the person. This sentence is thus felicitous without any contradiction between the two conjuncts. If a presupposition is involved, then contradiction arises, rendering 51 infelicitous.

3.5 Epistemic licensing

Counterfactual attitudes in TSM share some properties with attitudes containing a representational component, but differ from them in other respects, as we have mentioned in the foregoing subsections. In addition, one more significant distinction separating counterfactual attitudes from the other attitude types is their licensing behavior of epistemic modals.

Anand and Hacquard (2013) discuss the distribution of epistemic modals in three types of attitudinal contexts. They show that epistemic modals are acceptable in complements of representational attitudes, but they are degraded in complements of non-representational attitudes. As for the attitudes, which have a hybrid semantics combining a representational component and a preference component, they allow epistemic possibility modals but disallow necessity modals; see 12–16 above. Counterfactual attitudes in TSM behave differently from these three types of attitudes. They permit epistemic necessity but not possibility modals in their complement clauses. This is illustrated by 53 and 54.

(53) 我掠準伊昨昏一定會來, 結果伊無來。

gua2__liah8-tsun2__i1__tsa1-hng1__it4-ting7__e7__lai5,__kiat4-ko2__i1__bo5__lai5.

I__think__he__yesterday__must__will__come__as.a.result__he__NEG__come
I thought that he had to come yesterday, but he didn't come in the end.

(54) *我掠準伊昨昏可能會來, 結果伊無來。

*gua2__liah8-tsun2__i1__tsa1-hng1__kho2-ling5__e7__lai5,__kiat4-ko2__i1__bo5__lai5.

I__think__he__yesterday__might__will__come__as.a.result__he__NEG__come
I thought that he might come yesterday, but he didn't come in the end.

3.6 Summary

Counterfactual attitudes in TSM are representational and indicative-selecting attitudes, but unlike those typical representational attitudes, they do not have parenthetical uses.

They cannot be negated, either, since they have a counterfactual component in their semantics, which stands as a presupposition. This counterfactual component is also responsible for their epistemic licensing behavior, which distinguishes them from the other types of attitudes. Table 2 presents a comparison between counterfactual attitudes and the other attitude types. Based on these differences, I argue that counterfactual attitudes must be separated from the representational attitudes, and constitute a fourth type of attitude verb.

In the next section, I will give a semantic account of the distinctive properties of counterfactual attitudes in TSM, particularly their epistemic licensing property. The analysis I propose here builds on the interaction of the semantics of the embedding attitude verbs and the semantic requirements of the embedded epistemic modals à la Anand and Hacquard (2013).

4 The semantics of counterfactual attitudes

In this section, I first propose the semantics of counterfactual attitudes in TSM. The central goal of my proposal is to capture the distribution of epistemic modals in this attitudinal context based on the lexical semantics of the attitudes under discussion. In Section 4.3, I further raise a possible question about the observation concerning the epistemic licensing phenomenon of such attitudes, and strive to give a solution to this question.

4.1 Two meaning components

The syntactic and semantic properties of counterfactual attitudes in TSM presented in Section 3 give us a clear picture of their lexical semantics, which I argue is composed of two components. Such attitudes seem to convey two inferences: (a) that the attitude holder takes p , the prejacent proposition, to be true prior to the utterance, and (b) that the speaker takes $\neg p$ as established in the common ground prior to the utterance. The first inference captures the first half of the semantics of these attitudes—a representational component, viz. a universal doxastic assertion. It says that a counterfactual attitude like *liah8-tsun2* would quantify over a set of doxastic worlds, and that *liah8-tsun2* (p) expresses that all worlds compatible with the attitude holder x 's beliefs are the worlds such that p is true at a contextually salient past time (i.e., the attitude holder had such belief in p before the utterance time, at which the speaker made the report).

The other half of the semantics of these attitudes is taken care of by the interaction of the two inferences. The first inference states that the set of worlds that forms the quantificational domain, i.e., $D(w)$, which the attitude works on, is a set of p -worlds, and the second inference tells us that the set of common ground worlds, i.e., C , which contains all the background assumptions (by the speaker), is a set of $\neg p$ -worlds. Since $D(w)$ is totally excluded from C , which is taken as the world of evaluation (by the speaker), viz. the actual world, this gives rise to counterfactuality. The interaction of these two inferences leads to my proposal of a counterfactual felicity condition, which is the other meaning component involved in the semantics of the attitudes in question. This proposal is inspired by von Stechow's (a) discussion on the presupposition of subjunctive conditionals. One may question the validity of incorporating a felicity condition, which is pragmatic in nature, into semantics. It should be noted, however, that it is not unusual to integrate the pragmatic aspects of presupposition into

Table 2 A comparison of counterfactual attitudes with the other attitude types in TSM

Four types of attitude verbs	Representational?	Mood selection	Parenthetical uses	Negatable?	Epistemic licensing
Counterfactual attitudes	✓	Indicative	✗	✗	Necessity
Representational attitudes					
<i>lih8-tsun2</i> 相信 <i>siŋg1-sin3</i> 'believe'	✓	Indicative	✓	✓	Necessity/possibility
認為 <i>jin7-ui5</i> 'think'	✓	Indicative	✓	✓	Necessity/possibility
發覺 <i>huat4-kak4</i> 'discover'	✓	Indicative	✓	✓	Necessity/possibility
講 <i>kong2</i> 'say'	✓	Indicative	✓	✓	Necessity/possibility
Non-representational attitudes					
想欲 <i>siunn7-beh4</i> 'want'	✗	Subjunctive	✗	✓	✗
命令 <i>bing7-ling7</i> 'command'	✗	Subjunctive	✗	✓	✗
Hybrid attitudes					
懷疑 <i>huai5-gi5</i> 'doubt'	✓	Indicative	✗	✓	Possibility

semantics. That is what various proposals within the framework of dynamic semantics attempted to do; see Heim (1982, 1992) for instance. My proposal in this paper is another attempt to deal with presupposition (more specifically, counterfactual presupposition) in semantics.

Note also that the two inferences have different targets. The first inference is aimed at the attitude holder, and the second at the speaker. The attitude holder may or may not be the speaker, as I have demonstrated in the previous section. Here are some more data illustrating this point.

(55) 我掠準伊是查埔个。
 gua2__liah8-tsun2__i1__si7__tsa1-poo1-e5.
 I__think__she__COP__man
I thought that she was a man.

(56) 伊掠準我是查埔个。
 i1__liah8-tsun2__gua2__si7__tsa1-poo1-e5.
 She__think__I__COP__man
She thought that I was a man.

In 55, the attitude holder is the speaker. The speaker has already taken $\neg p$ as established in the common ground, and she further talks about her belief in p at a certain contextually salient past time. Accordingly, counterfactuality results. In 56, on the other hand, the attitude holder is not the speaker. The speaker takes $\neg p$ as established in the common ground, and she talks about the attitude holder's wrong belief in p at a certain contextually salient time prior to her utterance. Therefore, the counterfactual interpretation is brought forth when the viewpoint is anchored to the speaker.

To sum up, the two meaning components in the semantics of counterfactual attitudes in TSM can be formulated in 57. The Yalcinian notation is used for the formulation here. In 57, S is an information state parameter of evaluation, w is a world parameter of evaluation, and t represents a time prior to the time of evaluation, $t@$ (viz. the utterance time). Counterfactual attitude verbs update S with the set of worlds they quantify over, S' , which is the attitude holder x 's doxastic worlds, $DOX_{x,w,t}$. The first half of the truth-conditions states that the proposition ϕ is true in the whole quantificational domain that the counterfactual attitude verb works upon, and the second half states that such a domain, viz. the set of ϕ -worlds, is not included in the set of common ground worlds, where the proposition ϕ is false.

- (57) For any counterfactual attitude (att_{CF}):
- Doxastic assertion: $[[att_{CF} \phi]]^{c,w,S,g,t} = \lambda x. \forall w' \in S': [[[\phi]]^{c,w',S',g,t} = 1]$, where $S' = DOX_{x,w,t}$
 (In all worlds w' compatible with the attitude holder x 's beliefs in w at t , ϕ is true in w' .)
 - Felicity condition: $D(w) \not\subseteq C_t$
 (The set of ϕ -worlds is not a subset of C , which contains all $\neg\phi$ -worlds pre-established in C by the speaker at t , and $t < t@$.)

I propose that the first meaning component in 57a is responsible for the licensing of epistemic modals in the complement clauses of counterfactual attitudes, and the felicity condition in 57b is responsible for the disallowance of epistemic possibility modals. This counterfactual felicity condition is also the cause for the lack of parenthetical uses and the unnegatability of counterfactual attitudes.

4.2 Explaining the distribution of epistemic modals

Recall that counterfactual attitudes in TSM allow epistemic necessity but not possibility modals in their complement clauses, as shown by 53–54, repeated in 58–59.

(58) 我掠準伊昨昏一定會來, 結果伊無來。

gua2_liah8-tsun2_i1_tsa1-hng1_it4-ting7_e7_lai5,_kiat4-
ko2_i1_bo5_lai5.

I think he yesterday must will come as.a.result he NEG come
I thought that he had to come yesterday, but he didn't come in the end.

(59) *我掠準伊昨昏可能會來, 結果伊無來。

*gua2_liah8-tsun2_i1_tsa1-hng1_kho2-ling5_e7_lai5,_kiat4-
ko2_i1_bo5_lai5.

I think he yesterday might will come as.a.result he NEG come
I thought that he might come yesterday, but he didn't come in the end.

Here, I am going to present how my proposal accounts for this phenomenon. I adopt the proposal advocated by Veltman (1996), Hacquard (2006, 2010), and Yalcin (2007) that embedded epistemic modals obtain their modal bases via anaphoric reference.

My analysis goes as follows. The doxastic component in the semantics of counterfactual attitudes provides an information state that epistemic modals can be anaphoric to, thereby licensing epistemic modals; however, their counterfactual component filters out epistemic possibility modals since the resulting existential quantification over the information state via semantic composition of the modals and the embedding attitude implies that the domain of quantification is not totally excluded from the set of common ground worlds. This leads to violation of the felicity condition. Therefore, epistemic possibility modals cannot be licensed in this attitudinal context.

This analysis is formally represented below. The lexical entries for *liah8-tsun2*, and the two epistemic modals, 一定 *it4-ting7* 'must' and 可能 *kho2-ling5* 'might', are given in 60 and 61. Example 61 shows the truth-conditions of epistemically modalized sentences, in which epistemic modals, when unembedded, make claims with respect to *S*, the modal base that is assumed to be contextually provided, and the ordering source parameter *g* (Kratzer 1981, 1991). For epistemic necessity, the modal statement is true if and only if the modified proposition is true in all worlds *w'* compatible with *S* in *w*, and for epistemic possibility, the modal statement is true if and only if the proposition is true in some worlds *w'* compatible with *S* in *w*.

$$(60) [[liah8-tsun2(p)]]^{c,w,S,g,t} =$$

$$a. \lambda x. \forall w' \in S: [[[p]]^{c,w',S,g,t} = 1], \text{ where } S' = \text{DOX}_{x,w,t}$$

b. $D(w) \not\subseteq C_t = \forall w' \in \text{DOX}_{x,w,t} [[p]]^{c,w,S',g,t} \not\subseteq C_t$, where $[[\neg p]]^{c,w,g} = 1$ iff $\forall w'' \in C_t$: $[[\neg p]]^{c,w',g} = 1$ & $t < t@$

- (61) a. $[[it4-ting7(p)]]^{c,w,S,g} = 1$ iff $\forall w' \in S$: $[[[p]]]^{c,w',S,g} = 1$
 b. $[[kho2-ling5(p)]]^{c,w,S,g} = 1$ iff $\exists w' \in S$: $[[[p]]]^{c,w',S,g} = 1$

The truth-conditions for epistemic modals embedded under counterfactual attitudes are given in 62 and 63. Epistemic modals, when occurring in embedded contexts, obtain their modal bases from the embedding attitude verbs. In both cases, the counterfactual attitude verb *liah8-tsun2* provides the first layer of (universal) quantification over the doxastic state, and the epistemic modals provide the second layer of quantification over the same doxastic state, which is universal for epistemic necessity in 62, and existential for epistemic possibility in 63, respectively. As shown in the first halves of 62 and 63, the universal quantifier introduced by the attitude verb *liah8-tsun2* is vacuous, so it can just be removed. We therefore get the results as in 62a and 63a. While the result in 62a meets the felicity condition, the result in 63a does not. An inference could be yielded from 63a, which says that there would also be a world compatible with *x*'s beliefs at a contextually salient past time in which $\neg p$ was true; this thus leads to violation of the felicity condition in 63b. As a result, epistemic possibility modals are not acceptable in the counterfactual attitudinal context.

(62) Epistemic *necessity* embedded under *liah8-tsun2*:

- a. Doxastic assertion: $[[liah8-tsun2(it4-ting7 p)]]^{c,w,S,g,t}$
 $= \lambda x. \forall w' \in \text{DOX}_{x,w,t} [\forall w'' \in \text{DOX}_{x,w,t}: [p(w'')] = 1]$
 $= \lambda x. \forall w'' \in \text{DOX}_{x,w,t}: [p(w'')] = 1$
 $=$ In all of *x*'s doxastic worlds at a contextually salient past time, *p* was true.
 b. Felicity condition: $w'' \in \text{DOX}_{x,w,t} [[p]]^{c,w',S',g,t} \not\subseteq C_t$
 where $[[\neg p]]^{c,w,g} = 1$ iff $\forall w''' \in C_t: [\neg p(w''')] = 1$
 & $t < t@$
 $\ominus D(w)$ is totally excluded from C_t ; hence, the felicity condition is satisfied.

(63) Epistemic *possibility* embedded under *liah8-tsun2*:

- a. Doxastic assertion: $[[liah8-tsun2(kho2-ling5 p)]]^{c,w,S,g,t}$
 $= \lambda x. \forall w' \in \text{DOX}_{x,w,t} [\exists w'' \in \text{DOX}_{x,w,t}: [p(w'')] = 1]$
 $= \lambda x. \exists w'' \in \text{DOX}_{x,w,t}: [p(w'')] = 1$
 $=$ There is a world compatible with *x*'s beliefs at a contextually salient past time in which *p* was true.
 b. Felicity condition: $w'' \in \text{DOX}_{x,w,t} [[p]]^{c,w',S',g,t} \not\subseteq C_t$
 where $[[\neg p]]^{c,w,g} = 1$ iff $\forall w''' \in C_t: [\neg p(w''')] = 1$
 & $t < t@$
 $\vdash \exists w'' \in \text{DOX}_{x,w,t} [[\neg p]]^{c,w',S',g,t} \subseteq C_t$
 $\ominus D(w)$ is not totally excluded from C_t , so the felicity condition is not satisfied.

4.3 The modal 會e7 in TSM

The data given above demonstrate that the epistemic necessity modal, *it4-ting7*, can be licensed in the counterfactual attitudinal context, but the epistemic possibility modal,

kho2-ling5, cannot. Let us further consider the following example, in which the counterfactual sentence contains the modal *e7*. The modal *e7* in 64 is a future modal indicating the relative future orientation of the complement clause. This sentence expresses a presumption made by the attitude holder, the speaker in this case, and the modal *e7* may therefore be taken as an epistemic *possibility* modal (cf. Lien 2011). One may take this sentence as a counter-example to the conclusion drawn from the above observation that epistemic possibility modals cannot be licensed in the embedded context of a counterfactual attitude.

- (64) 我掠準伊會來。
 gua2__liah8-tsun2__i1__e7__lai5.
 I__think__he__will__come
I thought he would come.

Here, I would like to suggest a plausible explanation for this challenge. It has been argued (see, for example, Lien 2011 and Hsu 2013) that a division of labor is made to take care of the different functions of the modal *e7*. The modal *e7*, when used alone, is ambiguous between the dynamic and epistemic meaning, and its derivatives, such as 會曉 *e7-hiau2* ‘can (know-how),’ 會當 *e7-tang2* ‘can (potential/permissive),’ and 會使 *e7-sai2* ‘can (potential/permissive),’ are dynamic and deontic modals. The example 65 illustrates the dynamic abilitive use of the modal *e7*, and 66–68 are instances of its derivatives. All these cases can be embedded under counterfactual attitudes, as shown in 69 for example. This is because in these cases, the modal *e7* and its derivatives have their own modal bases (viz. dynamic or circumstantial), no matter whether they denote inherent ability or circumstantial possibility. They are not evaluated relative to the information state provided by counterfactual attitudes; therefore, the counterfactual felicity condition is not violated and no contradiction results.

- (65) 攔毋知影會生袂生咧。(SCZ 3, 13)
 koh4__m7__tsail-iann2__e7__senn1__be7__senn1__leh4.
 Still__NEG__know__can__pregnant__cannot__pregnant__PRT
Whether she can be pregnant or not is still questionable.
- (66) 美月會曉寫字啊。(SCZ 3, 25)
 bi2-guat8__e7-hiau2__sia2-ji7__ah4.
 BiQuat__can-know__write-word__PRT
BiQuat has been able to write.
- (67) 伊會當救咱个性命。(Iunn5, Un2-gian5 楊允言 2003: 156)
 i1__e7-tang2__kiu3__lan2__e5__senn3-mia7.
 He__can__save__we__MOD__life
He can save our lives.
- (68) 這物件會使(得)食。
 tse1__mih8-kiann7__e7-sai2(-tit4)__tsiah8.
 This__thing__can__eat
This thing is edible/this thing is permitted to eat.

(69) 我掠準伊會生...

gua2__liah8-tsun2__i1__e7__senn1...

I__think__she__can__pregnant

I thought that she could be pregnant...

On the other hand, the modal *e7* in the epistemic meaning usually denotes futurity or genericity. Consider the following examples. The modal *e7* in 70–71 expresses the (relative) futurity of the event, and in 72–73, it indicates regularity of the events described by the sentences.

(70) 小等咧伊就會來啊, 無要緊啦。(Iunn5, Un2-gian5 楊允言 2003: 858)

sio2-tan2-leh4__i1__to7__e7__lai5__ah4,__bo5__iau3-kin2__lah4.

Wait.a.minute__he__then__will__come__PRT__NEG__matter__PRT

Just wait a minute and he will come shortly, so don't worry.

(71) 我若嫁伊, 會認真做一个好家後。(Iunn5, Un2-gian5 楊允言 2003: 690)

gua2__na7__ke3__i1,__e7__jin7-tsin1__tso3__tsit4-e5__ho2__ke1-au7.

I__if__marry__he__will__earnest__act__one-CL__good__wife

If I marry him, I will do my best to be a good wife.

(72) 油菜花當黃當艷个時, 會有蜂仔、蝶仔來採蜜。(Iunn5, Un2-gian5 楊允言 2003: 355)

iu5-tshai3-hue1__tng1__ng5__tng1__iam7__e5__si5,__e7__u7__phang1-a2__iah8-a2__lai5__tshai2__bit8.

Rapeseed.flower__just__yellow__just__gorgeous__MOD__time__will__have__bee-DIM__butterfly-DIM__come__gather__nectar

Every time the rapeseed flowers become bright yellow and gorgeous, there would be bees and butterflies coming to gather nectar.

(73) 虎會食人。(Miaoli County Folk Story, 32, c, 18.34)

hoo2__e7__tsiah8__lang5.

Tiger__will__eat__person

Tigers eat people.

According to Carlson (1977), a generic sentence is interpreted universally. Therefore, such sentences are acceptable as embedded complements of counterfactual attitude verbs, giving rise to no contradiction in quantificational force. As for futurity, whether the word *will* is a tense or a modal operator still remains controversial (see, e.g., Copley 2002, Condoravdi 2003 and Klecha 2014 for a modal analysis, and Kissine 2008 and Del Prete 2014 for a temporal analysis); however, it has been widely accepted that the default interpretation of a sentence with a future morpheme is a universal quantification over a domain of possible alternatives (e.g., Copley 2002; Del Prete 2014; Giannakidou and Mari 2015, 2016), regardless of the source of the quantificational force (i.e., contributed by the future morpheme itself or obtained through the supervaluation of the global linguistic context in which the future morpheme is embedded; cf. Del Prete 2014). If we take this view, a sentence expressing future eventuality is compatible with embedding

counterfactual attitude verbs, too. Therefore, I argue that 64 is not a problem for the epistemic licensing of counterfactual attitudes in TSM (Giannakidou, Anastasia and Alda Mari 2015).

5 Conclusion

In this work, counterfactual attitudes in TSM were studied. I presented their syntactic and semantic properties, showing that they do not have the same behavior as typical representational attitudes with respect to the parenthetical use, negatability, and epistemic licensing. I also proposed a semantic analysis to account for these properties, explaining in particular why they allow epistemic necessity but not possibility modals in their complement clauses. I argued that there are two meaning components in their lexical semantics, one being the doxastic assertion and the other the counterfactual felicity condition. It is this latter component that distinguishes them from other representational attitudes.

Our findings in this paper suggest that counterfactual attitudes, which are not taken into account by Anand and Hacquard (2013), should be singled out from the representational category and constitute a fourth type of attitude verb. This study therefore contributes to the research on attitudes and motivates a finer-grained typology of attitudes based on the distributional differences of epistemic modals in complement clauses.

6 Endnotes

^aThis corpus (<http://140.114.116.3/DB/index.php>) is compiled by National Tsing Hua University, comprising both spoken and written data, collected from eight modern Taiwanese drama series and 40 folk stories. The eight drama series are 出外人生 *Chuwai Rensheng* (CWRS), 後山日先照 *Houshan Ri Xian Zhao* (HSRXZ), 呼叫223 *Hujiao 223* (HJ223), 四重奏 *Si Chong Zou* (SCZ), 鐵樹花開 *Tieshu Hua Kai* (TSHK), 酒矸通賣無 *Tsiu2-kan1 Thang1 Be7 Bo5* (TKTB5), 我在, 因為你的愛 *Wo Zai, Yinwei Ni-de Ai* (WZYWNDA), and 月亮出來了 *Yueliang Chulai-le* (YLCLL).

^bThe abbreviations used in this paper include the following: ASP = aspect marker, CL = classifier, COP = copula, DIM = diminutive suffix, MOD = modification marker, NEG = negation, PASS = passive marker, PRG = progressive marker, PRT = particle, Q = question marker, RETORT = retort marker, and SUBJ = subjunctive mood.

^cI am grateful to an anonymous reviewer for bringing this example to my attention.

^dI thank an anonymous reviewer for bringing my attention to this issue.

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Competing interests

The author declares that she has no competing interests.

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