

Causality and modality: A case study on Teochew periphrastic causatives

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Abstract. Many linguistics works have adopted the CAUSE operator to analyze causal relations. However, recent studies have gradually converged on the idea that a denotation like $\text{CAUSE}(e, e')$ is not sophisticated enough to capture complex causalities encoded in linguistic structures, echoing long-time discussions on causation in the field of philosophy. This study supports this view by working on the plural instantiations of causation encoded in five periphrastic causative constructions in Teochew, an understudied Southern Min language. I demonstrated causality notions encoded in Teochew causatives differ in four dimensions: (i) direct vs. indirect (temporal, spatial, intermediary agent), (ii) deterministic vs. probabilistic (in terms of the actuality entailment of the caused event), (iii) attitude-neutral vs. attitude-bearing (benefactive/adversative) and (iv) permissive vs. non-permissive. I provide a sublexical modal analysis paired with event semantics to capture these complexities, aiming to replace the monolithic CAUSE event linker and to show most of the causal complexities result from different flavors of sublexical modality encoded in the causative verbs.

Keywords. periphrastic causatives; (sublexical) modality; (in)direct causatives; actuality entailment; benefactive/adversative causatives; permissive causatives

1. Introduction. Philosophers have been long interested in the nature of causality. However, there is still no consensus despite countless treatments throughout the history of philosophy (Beebe et al. 2009). In contrast, linguists relied heavily on the monolithic CAUSE operator (Dowty 1979) to formalize causal meanings encoded in human languages. However, in the same spirit as ‘causal pluralism’ (see Godfrey-Smith (2009) for a review), some recent linguistic studies have proposed some new theoretical tools to capture the complex causal relations (e.g., Kaufmann 2013; Copley & Harley 2015; Martin 2018; Baglini & Bar-Asher Siegal 2020; Nadathur & Lauer 2020). Similar to discussions in the field of philosophy, such research can be divided into two groups. One is to focus on the ontological/conceptual nature of causation, on which most philosophical works concentrate; the other is to assume a single concept of causation with plural instantiations in the same spirit as the ‘amiable jumble’ criteria in Skyrms (1984). This study contributes to the second group of research.

The empirical domain of this study is five periphrastic causatives in an understudied language called Teochew (Southern Min, Sinitic), which have the same ‘causer-causative verb-causee-predicate’ surface structure but different causative verbs (1). Among them, the *bun*-causative is ambiguous between a ‘courtesy’ reading and a ‘permissive’ reading (1d-1e); in this paper, I treat them as different causatives with syncretic causative verbs.

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- (1) a. Nangy mue Mimi tsao.
 Nangy make Mimi run
 ‘Nangy makes Mimi run.’
- b. Nangy kə Mimi tsao.
 Nangy give Mimi run
 ‘Nangy causes Mimi to run.’ (Lit.
 ‘Nangy gives the running event to
 Mimi.’)
- c. Nangy hai Mimi tsao.
 Nangy hurt Mimi run
 ‘Nangy causes Mimi to run (adversative).’
- d. Nangy bun Mimi tsao.
 Nangy separate Mimi run
 ‘Nangy causes Mimi to run (benefactive).’
- e. Nangy bun Mimi tsao.
 Nangy separate Mimi run
 ‘Nangy lets Mimi run.’

One natural question to ask is, ‘Why does one language adopt so many different causative verbs in the same surface structure to express the causality notion, a pattern also observed in languages other than Teochew?’. The most intuitive answer is that causality encoded in the above periphrastic causative constructions are different from each other, realized in different causative verb forms. The next question is, ‘How much do they differ?’. In the rest of this paper, I will show they differ at least in four dimensions: (i) direct vs. indirect (temporal, spatial, intermediary agent) (Section 3), (ii) deterministic vs. probabilistic (Section 4), (iii) attitude-neutral vs. benefactive/adversative (Section 5) and (iv) permissive vs. non-permissive (Section 6). I will provide a modal analysis paired with event semantics to capture all these complexities, arguing the monolithic CAUSE event linker is not sophisticated enough, and showing most of the causal complexities result from different flavors of sublexical modality encoded in the causative verbs.

2. Some basics. First, all Teochew causatives are bi-eventive. This is evidenced by the grammaticality of using independent and semantically contrastive manner adverbs *meme* ‘quickly’ and *manman* ‘slowly’ to modify the causing event and the caused event in the format of ‘causer-*meme-mue/kə/hai/bun/bun*-causee-*manman*-predicate’. Second, these Teochew periphrastic causatives have different selectivity when it comes to the embedded predicates (Table 1; examples omitted due to space limit). Third, the animacy of the causer and causee also differs across different causatives (Table 1; examples omitted due to space limit).

3. Dimension I: (in)directness. Linguists usually differentiate two subtypes of causative constructions, ‘direct causatives’ vs. ‘indirect causatives’. There are two uses of terms for this distinction. The first is structurally defined as ‘lexical causative’ (direct) vs. ‘productive/ periphrastic/ morphosyntactic causative’ (indirect) (cf. Fodor 1970; Shibatani 1976; McCawley 1978; DeLancey 1984; Wolff 2003). The other is semantically defined in terms of the closeness between the cause and the result (e.g., Nedjalkov & Silnitsky 1973; Levin & Rapoport Hovav 1999) or between the participants in a causal chain, i.e., whether the causal chain allows an intermediary agent (e.g., Masica 1976). There are two positions in the literature trying to connect these two uses of terms. One position holds that the ‘lexical causative’ is more ‘direct’ in terms of interpretation (cf. Shibatani & Prashant 2002); the other believes such a connection does not exist, i.e., a ‘lexical causative’ can also be semantically ‘indirect’ (e.g., Neeleman & van de Koot 2012; Ramchand 2014). All Teochew causatives in this study are periphrastic, i.e., the structural variable is controlled so that they can serve as an interesting testing case for these two positions. I will show

Causatives		<i>mue</i> -caus.	<i>kə</i> -caus.	<i>hai</i> -caus.	<i>bun</i> -caus.	<i>bun</i> -caus.
Embedded predicate	unergative	✓	✓	✓	✓	✓
	transitive	✓	✓	✓	✓	✓
	ditransitive	✓	✓	✓	✓	✓
	unaccusative	✓	×	✓	×	×
	stative	✓	×	✓	×	×
	psych verb	✓	×	✓	×	×
	atelic predicate	✓	✓	✓	✓	✓
	telic predicate	✓	✓	✓	✓	✓
Causer	[+animate]	✓	✓	✓	✓	✓
	[-animate]	✓	✓	✓	×	×
Causee	[+animate]	✓	✓	✓	✓	✓
	[-animate]	✓	×	✓	×	×

Table 1. Some basic differences between Teochew periphrastic causatives

that causal (in)directness is more complex than what was discussed in the literature, supporting the delinking of connections between structural and semantic (in)directness.

First, when it comes to **temporal relations**, most linguistics studies adopt the following 3 logical possible temporal relations between two events: (i) posteriority (e_1 follows e_2), (ii) simultaneity (e_1 overlaps with e_2) and (iii) anteriority (e_1 precedes e_2). However, we know some sentences of natural language seem to describe events using extended temporal periods, and such periods can be regarded as comprising continuous stretches of instances of time. Therefore, ‘temporal relations among intervals are more diverse than those among instants’ (Kuhn & Portner 2002). Based on these, Kuhn & Portner (2002) lists 13 logically possible relations that an interval A can bear to the fixed interval B (see Table 2). I test whether each of them is compatible with different Teochew causatives with different embedded predicates shown in Table 1. Second, when it comes to testing the **spatial relation**, I use *dəngdio* ‘on the spot’ to modify the caused event, aiming for a proximal/direct spatial relation, and use *do bang lai* ‘inside the room’ and *do bang duakao* ‘outside the room’ to modify the causing event and the caused event respectively for a distal/indirect spatial relation. Finally, I test whether each causative is felicitous under a context where **an intermediary agent** exists in the causal chain. All the results are summarized in Table 2 (example omitted due to space limit).

As we can see, even though all Teochew causatives are ‘indirect’ in the structural sense, they are compatible with different ‘(in)direct’ causal event structural interpretations. This serves as a counterexample to the structural-interpretative (in)directness correlation argued by Shibatani & Prashant (2002) and as a new piece of empirical evidence to support Neeleman & van de Koot (2012) and Ramchand (2014) in dissociating these two kinds of ‘(in)directness’. Besides, three subdimensions of ‘(in)directness’ do not line up across five periphrastic causatives, indicating correlations between time, space and mediation do not seem to exist. That is to say, interpretative ‘(in)directness’ should be defined in terms of a two/three-subdimensional way, i.e., event (both temporal and spatial) and event participant. This contrasts Ramchand (2014), which argues that a participant-based causal relation deviates from an event-based one.

I follow Deal (2009) for denotations of spatial relations (proximal: $\sim_{sp}$; distal: $\not\sim_{sp}$). As for those for an intermediate agent, one natural question to ask is that, given it is an event participant, is it possible that its existence indicates the existence of another event other than the causing and

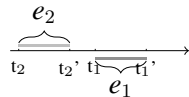
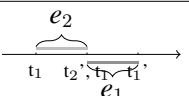
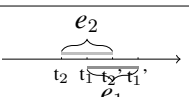
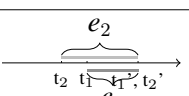
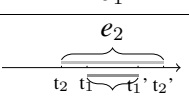
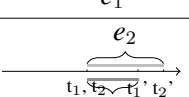
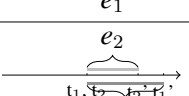
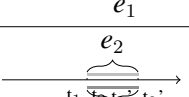
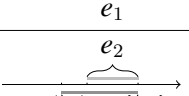
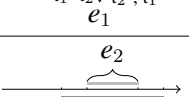
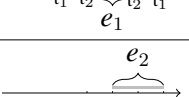
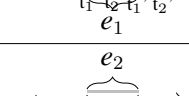
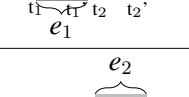
'(In)directness' (e_2 : causing event; e_1 : the caused even)			<i>mue</i> -caus.	<i>kə</i> -caus.	<i>hai</i> -caus.	<i>bun</i> -caus.	<i>bun</i> -caus.
Temporal	Posteriority		×	✓	✓	✓	✓
			✓	✓	✓	✓	✓
			✓	✓	✓	✓	✓
			✓	✓	✓	✓	✓
			✓	✓	✓	✓	×
	Simultaneity		×	×	×	×	×
			×	×	×	×	×
			×	×	×	×	×
	Anteriority		×	×	×	×	×
			×	×	×	×	×
			×	×	×	×	×
			×	×	×	×	×
			×	×	×	×	×
Spatial	Directness (i.e., proximal)		✓	✓	✓	✓	✓
	Indirectness (i.e., distal)		×	✓	✓	×	✓
Mediation	Directness (i.e., no intermediary agent)		✓	✓	✓	✓	✓
	Indirectness (i.e., allow intermediary agent)		×	✓	×	×	✓

Table 2. '(In)direct' causality in each Teochew causative

the caused ones? The fact that more than two manner adverbs, temporal modifications or spatial modifications are disallowed in each causative shows a third event does not exist. Therefore, I adopt a mereological approach (cf. Link 1983, 1998; Bach 1986; Krifka 1992) to encode the intermediate agent in the causing event e_2 . The lexical semantics of each causative can be represented as in (2), where the temporal, spatial and participant relations are encoded explicitly. By not specifying the spatial relation and whether there exists an intermediate AGENT, I assume this causative is neutral in terms of these two subdimensions of (in)directness.

- (2) a. $\llbracket mue \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \exists e_1. CAUSE(e_2, e_1) \wedge \forall t. [t \in \tau(e_1) \wedge t \in \tau(e_2)] \wedge \forall t'. [t' \in \tau(e_1) \rightarrow \exists t''. [t'' \in \tau(e_2) \wedge t'' < t']] \wedge \underline{e_2 \sim_{sp} e_1} \wedge \forall e_3. [e_3 \subset e_2 \rightarrow \neg \exists x. [Intermediary-AGENT(x)(e_2, e_3, e_1) \wedge \exists z[AGENT(z)(e_1) \wedge z \neq x] \wedge \exists y[AGENT(y)(e_2) \wedge y \neq x]]] \wedge P(e_1)$ (to be revised)
- b. $\llbracket k\partial \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \exists e_1. CAUSE(e_2, e_1) \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t]] \wedge P(e_1)$ (to be revised)
- c. $\llbracket hai \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \exists e_1. CAUSE(e_2, e_1) \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t]] \wedge \forall e_3. [e_3 \subset e_2 \rightarrow \neg \exists x. [Intermediary-AGENT(x)(e_2, e_3, e_1) \wedge \exists z[AGENT(z)(e_1) \wedge z \neq x] \wedge \exists y[AGENT(y)(e_2) \wedge y \neq x]]] \wedge P(e_1)$ (to be revised)
- d. $\llbracket bun \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \exists e_1. CAUSE(e_2, e_1) \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t]] \wedge \underline{e_2 \sim_{sp} e_1} \wedge \forall e_3. [e_3 \subset e_2 \rightarrow \neg \exists x. [Intermediary-AGENT(x)(e_2, e_3, e_1) \wedge \exists z[AGENT(z)(e_1) \wedge z \neq x] \wedge \exists y[AGENT(y)(e_2) \wedge y \neq x]]] \wedge P(e_1)$ (to be revised)
- e. $\llbracket bun \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \exists e_1. CAUSE(e_2, e_1) \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t] \wedge \neg \exists t''. [t'' \in \tau(e_2) \wedge t'' < t']] \wedge P(e_1)$ (to be revised)

4. Dimension II: actuality entailment. Since Dowty (1979), Pustejovsky (1995) and Higginbotham (2000), the CAUSE operator based on the ‘counterfactual theory’ in Lewis (1973) has been widely adopted to represent the causal links in a causal chain. However, probabilistic causation, where the actuality of the caused event is not entailed, poses a challenge to this approach.¹

Teochew periphrastic causatives also demonstrate this property, showing a *deterministic* (with the actuality entailment of result) vs. *probabilistic* (without the actuality entailment of result) contrast. More specifically, while the *mue* ‘make’-causative and the *hai* ‘hurt’-causative are deterministic causatives, the other three causatives, in contrast, do not entail the actuality of the caused event. Three groups of evidence support this conclusion, where both simplex predicates and VV compounds are used as embedded predicates.

First, it is felicitous to negate the caused event in the *k\partial* ‘give’-causative and the *bun/bun* ‘separate’-causative but not the other two causatives. Second, in a similar spirit, the second group of diagnostic is to test whether these causatives can be paraphrased into resultative constructions, i.e., serial verb constructions (3) and V-*gao* ‘arrive’-construction (4). As is shown below, the answer is yes for the *mue/hai*-causative but not the *k\partial/bun/bun*-causative.

¹ In fact, even before defeasible causation, linguists have long noticed the no actuality entailment issue in other language phenomena, suggesting this is an issue with a wider distribution than what people thoughts. Among these phenomena, the most studied case is the ‘imperfective paradox’ (e.g., Dowty 1979; Portner 1998).

- (3) a. Nangy mue/hai tsao Mimi.
Nangy make/hurt run Mimi
- b. *Nangy kə/bun/bun tsao
Nangy give/separate/separate run
Mimi.
Mimi

- (4) a. Nangy mue/hai gao Mimi tsao.
Nangy make/hurt arrive Mimi run
- b. *Nangy kə/bun/bun gao
Nangy give/separate/separate arrive
Mimi tsao.
Mimi run

Last but not least, without any context, scope ambiguous items can only target the causing event in the *kə/bun/bun*-causative, but they can target both the causing event and the caused event in the *mue/hai*-causative. Such items include but are not limited to (i) the pre-verbal negative morpheme *bo* occurring before the causative verb, (ii) the clause-final perfective marker *o/ku*, (iii) the adverb *gihu* ‘almost’ occurring before the causative verb (cf. McCawley 1971; Rapp & von Stechow 1999) and (iv) the adverb *yiiu* ‘again’ in front of the causative verb (cf. McCawley 1968; Dowty 1979; von Stechow 1995; Pytkanen 2008). Due to space limitation, please refer to Luo (2023) for examples of these scope ambiguous items in the *mue/kə*-causative.

I adopt the formal framework on modality in Kratzer (1977, 1981, 1991) and combine it with the ‘Modal Component Hypothesis’ (Koenig & Davis 2001) for analysis purpose. Given the causees in Teochew probabilistic *kə* ‘give’-causative and *bun/bun* ‘separate’-causatives can only be [+animate] (Table 1), I assume these three causative verbs *kə/bun/bun* each encodes a universal sublexical *volitional modality* (Portner 2009) with a circumstantial modal base and a stereotypical ordering source. In contrast, the deterministic causative verbs *mue* ‘make’ and *hai* ‘hurt’ each sub-lexically encodes a universal *metaphysical modality* (Portner 2009) with a metaphysical modal base and a circumstantial ordering source. As is shown in the semantics of ‘probabilistic/deterministic’ causatives in Teochew (5), I get rid of the CAUSE operator (Dowty 1979). Instead, in the same spirit of Portner (1998), I assume a modality-linked causal relation, where the caused event is connected to the causing event in a way that it is treated as the final part of the causing event developing along certain courses.

- (5) a. $\llbracket \text{probabilistic causation in Teochew} \rrbracket \rightsquigarrow \exists P. \exists e_2. \lambda w. [\forall w'. w' \in \text{VOL}(w, e_2) \rightarrow \exists e_1. [P(e_1)(w')]]$,
where e_1 represents the caused event and e_2 represents the causing event; $\text{VOL}(w, e_2)$ is defined as $\text{BEST}(\text{CIRC}, \text{ST}, e_2)$, i.e., the set of worlds w' in $\cap \text{CIRC}(e_2)$ such that there is no w'' in $\cap \text{CIRC}(e_2)$ where $w'' <_{\text{ST}, e_2} w'$.
- b. $\llbracket \text{deterministic causation in Teochew} \rrbracket \rightsquigarrow \exists P. \exists e_2. \lambda w. [\forall w'. w' \in \text{META}(w, e_2) \rightarrow \exists e_1. [P(e_1)(w')]]$,
where e_1 represents the caused event and e_2 represents the causing event; $\text{META}(w, e_2)$ is defined as $\text{BEST}(\text{META}, \text{CIRC}, e_2)$, i.e., the set of worlds w' in $\cap \text{META}(e_2)$ such that there is no w'' in $\cap \text{META}(e_2)$ where $w'' <_{\text{CIRC}, e_2} w'$.

Based on these, the lexical semantics of each causative verb can be further revised into (6), where the causal relation is denoted by modal semantics.

- (6) a. $\llbracket \text{mue} \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \lambda w. [\forall w'. w' \in \text{META}(w, e_2) \rightarrow \exists e_1. [P(e_1)(w') \wedge \exists t. [t \in \tau(e_1) \wedge t \in \tau(e_2)] \wedge \forall t'. [t' \in \tau(e_1) \rightarrow \exists t''. [t'' \in \tau(e_2) \wedge t'' < t']]] \wedge e_2 \sim_{sp} e_1 \wedge \forall e_3. [e_3 \subset e_2 \rightarrow \neg \exists x. [\text{Intermediary-AGENT}(x)(e_2, e_3, e_1) \wedge \exists z. [\text{AGENT}(z)(e_1) \wedge z \neq x] \wedge \exists y. [\text{AGENT}(y)(e_2) \wedge y \neq x]]]]]$
- b. $\llbracket \text{kə} \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \lambda w. [\forall w'. w' \in \text{VOL}(w, e_2) \rightarrow \exists e_1. [P(e_1)(w') \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t]]]]]$

- c. $\llbracket hai \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \lambda w. [\forall w'. w' \in \text{META}(w, e_2) \rightarrow \exists e_1. [P(e_1)(w') \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t]]] \wedge \forall e_3. [e_3 \subset e_2 \rightarrow \neg \exists x. [\text{Intermediary-AGENT}(x)(e_2, e_3, e_1) \wedge \exists z. [\text{AGENT}(z)(e_1) \wedge z \neq x] \wedge \exists y. [\text{AGENT}(y)(e_2) \wedge y \neq x]]]]]$ (to be revised)
- d. $\llbracket bun \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \lambda w. [\forall w'. w' \in \text{VOL}(w, e_2) \rightarrow \exists e_1. [P(e_1)(w') \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t]]] \wedge e_2 \sim_{sp} e_1 \wedge \forall e_3. [e_3 \subset e_2 \rightarrow \neg \exists x. [\text{Intermediary-AGENT}(x)(e_2, e_3, e_1) \wedge \exists z. [\text{AGENT}(z)(e_1) \wedge z \neq x] \wedge \exists y. [\text{AGENT}(y)(e_2) \wedge y \neq x]]]]]$ (to be revised)
- e. $\llbracket bun \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \lambda w. [\forall w'. w' \in \text{VOL}(w, e_2) \rightarrow \exists e_1. [P(e_1)(w') \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t] \wedge \neg \exists t''. [t'' \in \tau(e_2) \wedge t < t'']]]]]$ (to be revised)

5. Dimension III: benefactive/adversative. The third dimension these Teochew periphrastic causatives differ is whether they encode the speaker's attitude and are interpreted as a 'benefactive/adversative' causative.

In the literature, 'adversative/adversity causative' has been long associated with Japanese lexical causatives (e.g., Oehrle & Hiroko 1981; Miyagawa 1989; Harley 1996; Pytkkanen 2008). More specifically, in Japanese lexical causatives with an adversative interpretation, the nominative argument is interpreted as an affected argument of the event described by the main verb and it has a possession relation with the accusative argument. Interestingly, Teochew *hai*-causative also demonstrates a similar 'adversative' interpretation, though slightly different: the causee is adversely affected by the caused event, and the causer is the one to be blamed for causing it.² Even more interestingly, Teochew *bun*-causative serves as a contrasting case to the *hai*-causative, being interpreted as a 'benefactive' causative, where the causee is a beneficiary and the causer is one to be given credit to.

In other words, Teochew periphrastic causatives exhibit a contrast in terms of whether they encode the speaker's attitude or not: while the *mue/kə/bun*-causative is neutral, the *hai/bun*-causative bears the speaker's attitude. Four pieces of evidence support this. First, the 'benefactive/adversative' interpretation exists even when the event participants, i.e., the causer and causee, hold a contrastive attitude, suggesting the attitude reading comes from the speaker. Second, Teochew marks the speaker's attitude in the form of clause-final perfective markers: *o* (neutral/positive) and *ku* (negative). Misuse of aspectual markers is regarded as being impolite or ruthless. The *hai*-causative is incompatible with *o* but compatible with *ku*, while the *bun*-causative is compatible with *o* but not *ku*. The other three causatives can co-occur with both. Third, Teochew sentence-final confirming yes/no question marker *ho* can only occur in sentences indicating the neutral or positive attitude of the speaker. It is incompatible with the *hai*-causative but compatible with the other four causatives. Finally, *aodai!* is an emotional interjection used to indicate a strong positive attitude or appreciation towards an event that the speaker views as a morally good action. It is compatible with the *bun*-causative but not the *hai*-causative, and its acceptability with the other three causatives is relatively lower.

In the same spirit as previous discussions on attitude predicates (e.g., Hintikka 1961; Karttunen 1974; Heim 1992; Giorgi 1997; Portner 1997; von Stechow 1999; Schlenker 2005; Rubinstein 2017; Portner & Rubinstein 2020), I propose causative verbs *hai* and *bun* each sub-lexically encodes a *doxastic modality*, which has a doxastic modal base. When it comes to the ordering

² Syntactically, Teochew adversative causative also differs from the Japanese one. Due to the space limit, I will not elaborate on this here.

source, in the case of *hai*, I propose it has an *priority* ordering source pertaining to *malefaction*; similarly, *bun* has a priority one pertaining to *benefaction*.

Unlike the previous two dimensions, this attitude-bearing property only affects the (in)felicity rather than the truth value, and the following evidence supports that the attitude-bearing property comes from presupposition. First, the attitude-bearing reading projects from modal and negation (data omitted due to space limit). Second, this reading can be bound in the *if*-clause (data omitted). Finally, This reading occurs in a modified form when being the complement of the attitude predicate ‘believe’ (7) (cf. Potts 2003).

- (7) a. Xing siosiang Nangy hai Mimi tsao.
Xing believe Nangy hurt Mimi run
‘Xingy believes Nangy causes Mimi to run (adversative).’
⇒ It is Xingy rather than the speaker views the caused event as a ‘bad’ one for Mimi.
- b. Xingy siosiang Nangy *bun* Mimi
Xingy believe Nangy *separate* Mimi
tsao.
run
‘Xingy believes Nangy causes Mimi to run (benefactive).’
⇒ It is Xingy rather than the speaker views the caused event as a ‘good’ one for Mimi.

The lexical semantics for these two causative verbs are revised below, where there are two sublexical modalities encoded: one is in the at-issue meaning for the actuality entailment issue, and another one is in the presupposition accounting for the speaker’s attitude, where the selection function Sim_w in Heim (1992) is adopted to help indicate a preference for one scenario over another through making use of a concept of comparative similarities among worlds.

- (8) a. $\llbracket hai \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \lambda w: \exists e_1. DOX_{MAL}(P)(e_1)(w). [\forall w'. w' \in META(w, e_2) \rightarrow \exists e_1. [P(e_1)(w') \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t]] \wedge \forall e_3. [e_3 \subseteq e_2 \rightarrow \neg \exists x. [Intermediary-AGENT(x)(e_2, e_3, e_1) \wedge \exists z[AGENT(z)(e_1) \wedge z \neq x] \wedge \exists y[AGENT(y)(e_2) \wedge y \neq x]]]]]]]$, where $DOX_{MAL}(P)(e_1)(w)$ is true in w iff for every $w'' \in DOX_{MAL}(w)$, $Sim_{w''}(\{ v: v \in DOX_{MAL}(w) \wedge P(e_1)(v) \}) <_{PRIO-MAL} Sim_{w''}(\{ v': v' \in DOX_{MAL}(w) \wedge \neg P(e_1)(v') \})$.
- b. $\llbracket bun \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \lambda w: \exists e_1. DOX_{BEN}(P)(e_1)(w). [\forall w'. w' \in VOL(w, e_2) \rightarrow \exists e_1. [P(e_1)(w') \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t]] \wedge e_2 \sim_{sp} e_1 \wedge \forall e_3. [e_3 \subseteq e_2 \rightarrow \neg \exists x. [Intermediary-AGENT(x)(e_2, e_3, e_1) \wedge \exists z[AGENT(z)(e_1) \wedge z \neq x] \wedge \exists y[AGENT(y)(e_2) \wedge y \neq x]]]]]]]$, where $DOX_{BEN}(P)(e_1)(w)$ is true in w iff for every $w'' \in DOX_{BEN}(w)$, $Sim_{w''}(\{ v: v \in DOX_{BEN}(w) \wedge P(e_1)(v) \}) <_{PRIO-BEN} Sim_{w''}(\{ v': v' \in DOX_{BEN}(w) \wedge \neg P(e_1)(v') \})$.

Connections between causality and moral reasoning have been long discussed in the philosophical literature (cf. Lagnado & Gerstenberg 2017). Teochew periphrastic causatives bearing the speaker’s attitude provide interesting cases to see how grammatical causative structures encode moral reasoning. This further proves the traditional, reductionist approaches to causation are not sophisticated enough and lends additional support to my claim that many variations we find in causative structures are attributed to sublexical modalities.

6. Dimension IV: permissive. The final causal meaning dimension is whether the causative encodes a ‘permissive’ reading. In the case of Teochew, this is done by encoding social relations between the causer and the causee. To be more specific, in the *bun*-causative, the causee, different

from those in other Teochew causatives, is interpreted as of a lower social status and is permitted by the causer of a higher social status to do the caused event.

Evidence comes from the fact that in Teochew, the clause-final emphatic yes/no-question marker *meh* can only target an event participant of a higher social status (e.g., more senior), no matter its syntactic position (9).

- (9) a. Tsiangbue lo gi haosegia
 senior PROG meet junior
 [meh]?
 [Q_{sc}]
 ‘Is it the senior that is meeting with the junior?’ NOT ‘Is it the junior that the senior is meeting with?’
- b. Haosegia lo gi tsiangbue
 junior PROG meet senior
 [meh]?
 [Q_{sc}]
 ‘Is it the senior that is meeting with the junior?’ NOT ‘Is it the junior that the senior is meeting with?’

Meh can only target the causer, not the causee in the ‘permissive’ *bun*-causative, even though both the causer and causee are indicated by proper name, and there is no context provided (10). However, *meh* can target either of them in the other Teochew causatives depending on the world knowledge of the speaker about the hierarchical social relations between event participants.

- (10) Nangy *bun* Mimi tsao [meh]?
 Nangy *separate* Mimi run [Q_{sc}]
 ‘Is it Nangy that cause Mimi to run by giving permission to that one for running?’ NOT ‘Is it Mimi that Nangy causes to run by giving permission to that one for running?’

In the literature, it has been long noticed that certain cross-linguistic periphrastic causative have a similar ‘permissive’ or ‘allowing’ interpretation, e.g., English *let*-causative, Mandarin *rang*-causative (Luo & Kang 2023), and German *lassen*-causatives (Pitteroff 2014). However, to my knowledge, there are very few explicit discussions on what a ‘permissive’ reading is in the context of causative. This study aims to fill this research gap. I combine insights from the classic philosophical discussions on ‘permission’ in Kamp (1973) and Lewis (1979), and propose the causative verb *bun* sublexically encodes an existential *deontic modality*, with a circumstantial modal base and a deontic ordering source sensitive to social relation between event participants.³

Same as the third dimension, the ‘permissive’ reading is a presupposition, given it (i) does not affect truth value, (ii) projects from modal and negation and (iii) occurs in a modified form when being the complement of the verb ‘believe’ (data omitted due to space limit). Interestingly, the social relation reading patterns like a conventional implicature (cf. Potts 2003, 2007a,b, 2015): (i) it cannot be bound in the *if*-clause and (ii) cannot be modified when being the complement of attitude predicates. This corresponds to my proposal treating this reading as being encoded in the modal background. Therefore, I propose the following lexical semantics for the causative verb *bun*, where two modalities, one in the presupposition accounting for the ‘permissive’ reading and the other in the at-issue meaning corresponding to the actuality entailment issue, are sublexically encoded.

³ This is also in the same spirit of the modal analysis of imperative (e.g., Schwager 2006; Crnic & Trinh 2009; Condonavdi & Lauer 2012; Kaufmann 2012; Keshet 2013; Keshet & Medeiros 2019). Such a way to incorporate properties of the event participant into the modal grounds can also find correspondence in studies on attitude predicates (e.g., Anand & Hacquard 2013; Portner & Rubinstein 2020).

- (11) $\llbracket \text{bun} \rrbracket \rightsquigarrow \lambda P. \lambda e_2. \lambda w. \exists e_1. \text{DEON}(P)(e_1)(w). [\forall w'. w' \in \text{VOL}(w, e_2) \rightarrow \exists e_1. [P(e_1)(w') \wedge \forall t. [t \in \tau(e_1) \rightarrow \exists t'. [t' \in \tau(e_2) \wedge t' < t] \wedge \neg \exists t''. [t'' \in \tau(e_2) \wedge t' < t'']]]]$, where $\text{DEON}(P)(e_1)(w)$ is true in w iff there exists some worlds $w'' \in \text{DEON}(w, e_2)$ such that $P(e_1)$ happens in w'' but not before the starting time of e_2 ; in additions, there also exists some other worlds $v \in \text{DEON}(w, e_2)$ such that $P(e_1)$ does not happen/is prohibited in v . $\text{DEON}(w, e_2)$ is defined as $\text{BEST}(\text{CIRC}, \text{DEON}_{SC}, e_2)$, i.e., the set of worlds w' in $\bigcap \text{CIRC}(e_2)$ such that there is no w'' in $\bigcap \text{CIRC}(e_2)$ where $w'' <_{\text{DEON}_{SC}, e_2} w'$. For every event e in the domain of $\bigcap \text{DEON}_{SC}(e_2)$, $\forall x. [\text{AGENT}(e_2, x) \rightarrow \forall y. [\text{AGENT}(e, y) \rightarrow x \prec y]]$. $\prec$ is ranked along *kinship hierarchy, age, seniority...* when cross-scale ranking happens, *kinship hierarchy* $\prec$ *age* $\prec$ *seniority*.

7. Conclusion and discussion. As was shown in previous discussions, the causal relations encoded in these Teochew causative verbs are different in four dimensions: (i) direct vs. indirect (temporal, spatial, intermediary agent), (ii) deterministic vs. probabilistic, (iii) attitude-neutral vs. benefactive/adversative and (iv) permissive vs. non-permissive. These differences are reflected in the lexical entry of each causative verb, which also explains why one language will use more than one causative verb in constructions of the same surface structure.

One might ask whether it is possible that some of the above causal (sub)dimensions are contradictory to each other or whether some of them entail or are associated with others. Here, I will provide a primary discussion on the compatibility between each (sub)dimension in every causative, with an aim to shed light on future discussions along this line.

First, in the case of *mue*-causative (6a), which is a ‘**pure deterministic causative**’, the study demonstrates that this causative disallows a gap between the ending time of the causing event and the start time of the caused event, a distal spatial relation and the existence of an intermediate agent. Such a preference for directness in a causal relation entailing the actuality of the caused event intuitively makes sense. When there is no temporal, spatial, or participant gap between the caused event following the causing event, there is a higher possibility that the caused event will happen at the end. Such kind of connections are also discussed in see Lauer (2010), Martin (2018), Baglini & Bar-Asher Siegal (2020) among others when it comes to associating the interpretative (in)directness, and (non-)actuality entailment of the result corresponding to the causal necessity vs. causal sufficiency in philosophical discussions.

Second, in the case of *kə*-causative (6b), which is a ‘**pure probabilistic causative**’, this study shows that it allows any kind of temporal relation as long as the starting time of causing event is before that of the caused event and it is neutral when it comes to spatial and participant (in)directness. This also intuitively makes sense since a causal relation not entailing the result actuality has no preference for different subdimensions of (in)directness, which follows the same logic I argue for ‘pure deterministic causative’.

Third, in the case of *hai*-causative (8a), which is a ‘**adversative deterministic causative**’, this study shows that like the ‘pure probabilistic causative’, it allows any kind of temporal relation as long as the starting time of the causing event is before that of the caused event and it is neutral when it comes to spatial (in)directness. But interestingly, it disallows the existence of an intermediate agent. Actually, this also intuitively makes sense in that in an ‘adversative’ causative, where the causer is interpreted as someone to be blamed for bringing about a ‘bad’ result, if an intermediate agent exists, it will lead to difficulty in picking out the event party to take responsibility.

Fourth, in the case of *bun*-causative, which is a ‘**benefactive probabilistic causative**’, this

study shows that it allows any kind of temporal relation as long as the starting time of the causing event is before that of the caused event, but disallows spatial indirectness and the existence of an intermediate agent. The incompatibility between a ‘benefactive’ action with an intermediate agent intuitively makes sense, since it is also somehow connected to the responsibility issue mentioned in the case of ‘adversative deterministic causative’, though in this case, it is about giving credit. In other words, ‘attitude-bearing causatives’, at least in the case of Teochew, disallow an intermediate agent out of concern of tracing back to the responsibility/credit to the causer. Besides, the ungrammaticality of an indirect/distal spatial relation may be due to the fact that a ‘benefactive’ action, at least in the case of Teochew, requires a proximal spatial relation between the causing event and the caused event.

Additionally, there is an interesting contrast between ‘adversative deterministic causative’ and ‘beneficial probabilistic causative’ in terms of the actuality entailment issue of the caused event, i.e., while an ‘adversative’ reading pairs with a ‘deterministic’ causative, a ‘beneficial’ reading pairs with a ‘probabilistic’ causative. Intuitively, it does follow that once the result actually happens, it is easier to project a ‘negative’ attitude towards it; in contrast, while people have no idea about the result actuality, they will tend to be positive or neutral, rather than being negative given that there is no clue. Additionally, Lelia Glass (p.c.) points me to the so-called ‘Anna Karenina Principle’ (Diamond 1997) in the field of social psychology, which might help link the necessity/sufficiency contrast to an emotional distinction between good and bad outcomes here.⁴

Finally, in the case of *bun*-causative (11), which is ‘**permissive probabilistic causative**’, given a ‘permission’ action has no requirement on a proximal spatial relation and the (non)existence of an intermediate agent (i.e., someone else can pass on the permission from the causer to the causee), its neutrality towards these two subdimensions is expected. In terms of temporal relation, in addition to marking that the starting time of the causing event must be before that of the caused event, the ending time of the causing event cannot be later than that of the caused event. This also intuitively follows, given that it is unnecessary to continue the causing event indicating the permission once the caused event has ended. Last but not least, the ‘permission’ reading is also compatible with the no actuality entailment of the caused event. Intuitively, a permission action usually does not guarantee the permitted action will happen in the end. Discussions along a similar line on permittee with free choice can be found in Kamp (1973), Portner (2012) and among others.

To summarize, this study shows instantiations of causal relations are complex, even though they are encoded in the same syntactic construction, i.e., periphrastic causative. They cannot be easily captured by the widely adopted monolithic CAUSE operator, and an analysis featuring event semantics paired with modal semantics can help capture the complexity. Most of the causal complexities result from different flavors of sublexical modality encoded in the causative verbs.

In the final, I would like to briefly address the possibility of adopting the alternative *Causal Models* approach (e.g., Pearl 2000, 2009; Paul & Hall 2013) to explain the above complex causal relations encoded in Teochew periphrastic causatives. For **Dimension I on (in)directness**, the data shows that variables in a causal model need to be defined in a two-dimension (i.e., event and event participant) or a three-dimension (i.e., time, space and participant) way. While adding into

⁴ See Lelia’s manuscript in revision for journal publication which she makes use of this principle to explain why English ‘cause’, compared to other causative verbs, favors negative-sentiment complements. I thank her for generously sharing the manuscript with me.

the variable nodes two different types of relators might seem logically possible, it also makes this underdeveloped mechanism too theoretically unconstrained. **Dimension II on actuality entailment** is probably the easiest one to be implemented in a causal model. One alternative is to follow what Baglini & Bar-Asher Siegal (2020), Nadathur & Lauer (2020) and many others did, making the distributions of directed nodes in the causal graph representing the causal knowledge a representation of this causal sufficiency/necessity relation. The other alternative is to follow Paul & Hall (2013), assuming that the arrows are token-level stimulatory connections between nodes and that the stimulatory signal can be probabilistic. For **Dimension IV on encoding speaker's attitude**, to my knowledge, currently, there is no mature technique to build the attitude of an event observer into a causal model. Lastly, in the case of **Dimension IV on 'permission'**, we face a mix of issues: event participants (cf. Dimension I) with a social relation hierarchy observed by an event observer (cf. Dimension III) need to be built into the model, together with the deontic meaning which is also hard to be encoded. Given the discussions so far, I think we can safely conclude that a *causal model* analysis is not as sophisticated and fine-grained as an analysis featuring *event semantics paired with modal semantics*. Though I am optimistic about the future fine application of *Causal Models* in linguistics, I choose modal semantics as an analytic tool to account for the Teochew data.

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