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Modality for mixed quotation

1 Introduction. Theoretical considerations grounded in Tarskian semantics and empirical data suggest that the presence of quotation is universal across languages. For speech events it comes in two basic types, i.e. *direct* and *mixed quotation*, as in pair-wise equivalent examples in (1) and (2), respectively.

(1) a. He said (*that) 'good morning '.

 b. Kare-wa 'konnitiwa'   to   itta.   [Japanese]
  He-TOP 'good morning' COMP said

(2) a. He saw 'the worst president ever'.

 b. Kare-wa 'sizyô saiaku-no daitôryô'-o   mita.   [Japanese]
  He-TOP 'ever worst.GEN president'-ACC saw

Still, this does not meant that quotation is uniform across languages. Japanese requires in direct quotation as in (1b) the overt complementizer *to*, contrary to English as in (1a) where its presence is blocked. Thus it is an interesting fact that for mixed quotation Japanese provides the same pattern as English, requiring no additional marker. This supports the hypothesis that mixed quotation with quotes neither affecting the properties of expressions they flank nor adding new markers is cross-linguistically universal.

Though mixed quotation has inspired novel approaches in formal semantics (Maier 2014; Shan 2010), no closer attention has been paid to a different type of modality it gives rise to. To see this, assume the context in (3) and consider the examples in (4):

(3) **Context:** There is strong evidence that (i) Ojin was an emperor of Japan in the 3rd c., (ii) *Yamatai* was a name of Japan no latter than in the 3rd c. Taking part in a discussion on the history of the Japanese language, one can make the following content-wise identical statements:

(4) a. Ojin might have ruled 'Yamatai'.

 b. Ôzin-ga   tôti sita no-wa   'Yamatai' kamosirenai.   [Japanese]
  Ôzin-NOM rule did NMLZ.-TOP 'Yamatai' might.
  It was 'Yamatai' that Ojin might have ruled.

Examples in (4) allow two readings (in Japanese the cleft construction sounds more natural). First, assuming Kratzer's modality and Maier's (2014) semantics of mixed quotation, $[\![(4a)]\!] = 1$ iff there is some R-accessible $w_1 : w_1 \in$ *Ojin rules what he calls 'Yamatai'*. In this reading (4) state a possible scenario of Ojin's governance. The second interpretation, more accurate given the context in (3), is rooted in the fact that quotes provide another dimension specifying the way a given object is referred to (Maier 2014). Then modality concerning Ojin's use of language can be roughly interpreted as follows:

(5) Ojin ruled c: it is possible that Ojin referred to c with the word *Yamatai*

In this reading (4) state not a possible scenario of Ojin's governance, but a possible term he could use.

2 The problem. This shows that mixed quotation appearing within a modal scope gives rise to a special type of modality. Rather than providing possible situations for certain individuals, it provides possible uses of language attributed to such individuals. Put differently, **rather than stating ways a world might be, modality provides ways a language used to describe worlds might be.**

This is a puzzling problem for model-theoretic settings. They assume that worlds stand for different scenarios holding for individuals. These scenarios are picked out by expressions defined within a model as holding for particular worlds. Modals, then, allow to shift the world of interpretation. But this is not what is required by the second reading of (4). Here it is not the scenario of Ojin's governance that is subject to modal operation, but a term he might have used to describe this scenario. Thus the problem extends the standard machinery where modals shift worlds of interpretation. Moreover, the puzzle does not instantiate the so-called *metalinguistic comparative*. Contrary to such constructions (Herburger & Rubinstein 2019), (4) does not involve judgements about the aptness of using a given term, but the possibility of a term being defined in a certain way. Rather, what is required by (4) is an interpretation relativized to a model in which the term is defined. Put informally, one might take $[\![(4a)]\!] = 1$ iff there is some accessible model $\mathcal{M}_1 :$ *Ojin ruled what is defined in $\mathcal{M}_1$ as 'Yamatai'*. Modality sketched this way delivers possible ways a model defining expressions might be. Still, two questions immediately arise. **First**, how to secure a compositional semantics for the new type of modality? **Second**, in virtue of what is this type of modality universal? I discuss the two problems below.

3a A compositional semantics for the new type of modality. Operators shifting models of interpretation are not entirely new in the literature. They were introduced e.g. by Lindström (2006) in order to account for logical necessity. The present problem is how to match such operations with the fact that modals in (4) provide a possibility holding for Ojin's model of language as in (5). In order to account for this, I assume hybrid modality (Herburger & Rubinstein 2019; Klecha 2014) making use of

operators shifting worlds/models as well as measure functions delivering probabilities (Lassiter 2017). I define the core of this system in two steps. **First**, I follow Wiślicki (2018) in letting quotes in examples like (4) be a possibility operator $\mathsf{Q}_\Diamond$ shifting interpretation across accessible models; these are defined in terms of knowledge concerning terms as in (7), by partial analogy with the standard accessibility in (6):

(6) wRw_1 iff all ϕ known in w hold in w_1

(7) $\mathcal{M}R\mathcal{M}_i$ iff every expression E known to be defined in $\mathcal{M}_i$ is defined for the quotational context as 'E' in $\mathcal{M}$

Thus letting quoted speakers be parametrized like attitude holders in attitudinal contexts (Yalcin 2007), if $\mathcal{M}_o$ is a model of language used by Ojin then quotation in (4) is formalized as follows:

(8) $[\![\text{'Yamatai'}]\!]^{\mathcal{M},w,Ojin} = c$ iff $\exists \mathcal{M}_o : \mathcal{M}R\mathcal{M}_o \,\&\, c$ as defined in $\mathcal{M}_o$ has the utterance form $\ulcorner\text{Yamatai}\urcorner$

So, the first step secures the model shifting. The **second** step provides the new type of probability as in (5), i.e. the one concerning not a possible scenario of Ojin's governance, but a possible language used by Ojin. Given an ordering g, I let μ be an order-preserving measure function from propositions to real numbers $\mathbb{R}$ (Lassiter 2017) which for the discussed type of modality is defined as in (9):

(9)   Let $\phi_{\mathcal{M}_i}$ be a proposition such that (i) ϕ contains a quotational expression 'E'; (ii) 'E' quotes an expression E defined in an $\mathcal{R}$-accessible model $\mathcal{M}_i$. Then there is a measure function $\mu : \{\phi_{\mathcal{M}_i}\} \to [0,1]$ where the interval $[0,1]$ in $\mathbb{R}$ is the probability scale and $\mathcal{M}_i \succ_g \mathcal{M}_j \Rightarrow \mu(\phi_{\mathcal{M}_i}) > \mu(\psi_{\mathcal{M}_j})$

Here $\mu(\phi_{\mathcal{M}_i})$ is the probability of E occurring in ϕ having, as defined in $\mathcal{M}_i$, the utterance form $\ulcorner E \urcorner$.

Let us return to (4). Assume an $\mathcal{R}$–accessible model $\mathcal{M}_y$ of language used by Ojin where the name of Japan as defined in $\mathcal{M}_y$ has the utterance form $\ulcorner\text{Yamatai}\urcorner$. It follows from (3) that Ojin might use the term *Yamatai*. I capture this by letting $\mathcal{M}_y$ be ordered by $\succ_g$ in such a way that it is above a contextually salient threshold t, abbreviated as $\mathcal{M}_y \succ_g t$. Then (4a) has the following simplified computation:

$[\![\text{Ojin ruled 'Yamatai'}]\!]^{\mathcal{M},w,Ojin} = [\![\phi_{\mathcal{M}_y}]\!]^{\mathcal{M},w,Ojin} = 1$ [by (7), (8), FA]

iff $\exists \mathcal{M}_o : \mathcal{M}R\mathcal{M}_o \,\&\, \langle Ojin, c \rangle \in [\![ruled]\!]^{\mathcal{M},w}$

where c as defined in $\mathcal{M}_o$ has the utterance form $\ulcorner\text{Yamatai}\urcorner$

$[\![\text{Ojin might have ruled 'Yamatai'}]\!]^{\mathcal{M},w,Ojin} = [\![\text{might}]\!]^{\mathcal{M},w}([\![\phi_{\mathcal{M}_y}]\!]^{\mathcal{M},w,Ojin}) =$ [by $\succ_g$, Lassiter 2017]

$\lambda p_{\langle s,t\rangle}.\mu_{might}(p) > 0(\phi_{\mathcal{M}_y}) = \mu_{might}(\phi_{\mathcal{M}_y}) > 0$ [by FA]

Thus $[\![(4a)]\!] = 1$ iff given that in the relevant context $\mathcal{M}_y \succ_g t$, the probability that $c :$ Ojin ruled c, is referred to in Ojin's model of language with the utterance form $\ulcorner\text{Yamatai}\urcorner$ is higher than 0. The computation is compositional and, making use of modality defined in (7)–(8) as well as the measure function in (9), technically does not depart from existing systems (Klecha 2014; Lassiter 2017).

3b The universal character of the new type of modality. Let us now move to the second problem mentioned in Section 2, i.e. the universal character of this type of modality. I take this to follow directly from Tarskian semantics. Natural languages must provide a way of referring to their own expressions, for the sake of truth judgements or simply of defining terms. This is why they universally provide quotation. Accordingly, what would be odd and require explanation is a contrary situation where languages did not allow their users to refer to possible expressions and, more generally, to possible languages. This claim is supported by two factors. **First**, that the discussed type of modality is observed in languages showing different patterns for quotation. **Second**, that it can be accounted for by essentially the same machinery as standard modality defined for worlds and shown to work universally across languages.

4 Conclusion. The contribution of this paper is two-fold. **(i)** it presents a new type of modality together with a compositional computation and arguments for its universal character. **(ii)** it opens up a new path for future research on the extent to which the new type of modality is universal across other areas of metalinguistic discourse, as recently investigated for attitudinal contexts by Tancredi & Sharvit (2019).

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