THE ASSOCIATION OF EPISTEMIC MODALITY AND ASPECT IN MAKKAN ARABIC: THE CASE OF *QAD**

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This paper represents a continuation of the growing literature that is interested in understanding the relation between modal and aspectual morphology (e.g. Bhatt 1999; Piñón 2003, 2009; Hacquard 2006, 2009; Mattheson, Davis and Rullmann 2007). We observed that Makkan Arabic (MA), a variety of Arabic spoken in the Hijazz region of Saudi Arabia, has a modal called *qad*. Our evidence is derived from a MA corpus where the modal *qad* interacts with aspect and yields multiple interpretations.[1]

The exact nature of the modal flavor of *qad* varies depending on whether an embedded clause under the modal is *perfective* or *imperfective*. We will concentrate on those cases in which *qad* appears to have an 'epistemic' modal (i.e., non-root) flavor. This novel observation corresponds with the general consensus about the modal *qad* in Arabic descriptive grammars by Al-Muradi (1992); Al-Ansarie (1964) as well as modern Arab linguists Bahloul (2008); Fassi Fehri (2012).[2]

Some of the effect of the *qad*-aspect interaction is similar to an effect known in the literature as 'actuality entailment'. The effect of actuality entailment has been previously observed in various languages such as Hindi-Urdu (Bhatt 1999), English (Piñón 2003, 2009) and French (Hacquard 2006; 2009). In these languages, some modals with perfective aspect give rise to the inference that an eventuality has actually taken place in the actual world. In MA, the modal *qad* with the perfective also leads to this intuition.

Much of the attention in the literature on actuality entailments has been devoted to the interaction between root modals and aspectual morphology (Bhatt 1999; Piñón 2003, 2009; Hacquard 2006, 2009). Unfortunately, this creates a gap in the literature of epistemic modals. To the best of our knowledge, actuality entailments have not been investigated with epistemic modals yet; claims of absence of actuality entailment with epistemic modals are found in Portner's (2009) and Hacquard's (2014) works.

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[1]The MA corpus was built in the summer of 2015; data were collected from MA native speakers in informal conversations.

[2]Al-Muradi and Al-Ansarie are eminent Arabic grammarians. Al-Muradi's and Al-Ansarie's manuscripts remain enormously influential in Arabic grammar specifically Arabic particles. The former grammarian died in 749 A.H. / 1348 A.D., and the latter died in 761 A.H/ 1360 A.D. Their manuscripts became available to researchers in the nineteenth century.

(1) "Epistemic modals do not show actuality entailment." (Portner 2009: 204)

(2) "not all modal flavors trigger actuality entailments: *epistemic* modals, which describe possibilities given a body of evidence, do not. No actuality entailment arises with perfective on French *pouvoir*, when it expresses epistemic possibility."

(Hacquard 2014: 3)

In seeking to account for the epistemic modal-aspect interaction, we propose an analysis in the spirit of Kratzer's modal theory (1981, 2012). In Kratzer's modal theory, two ingredients are involved in the modal interpretation. They are a modal base f and an ordering source g. Kratzer (2012) developed her modal theory to account for cross-linguistic variation in quantified force by manipulating the interaction between modal base and ordering source. Our proposal focuses on manipulating the ordering source. A detailed discussion will be given in §4.1.

A road map of the paper is provided here. Section 2 describes key data about the interaction between the epistemic modal *qad* and aspectual morphology. The same section introduces the puzzle of this paper as well as the proposal, which is specifically tailored for the modal *qad* and is briefly discussed. In §3, previous works on the topic of modal-aspect interaction are presented. The subsections in §3 present critiques of Bhatt's proposal and Hacquard's with respect to the novel data. In §4, we introduce two ideas regarding the association of *qad*-aspect in MA; we end up §4 by evaluating the two views. The conclusion summarizes our discussion of *qad*-aspect in §5.

1. The characterization of the modal *qad*

In this section, we describe the observations surrounding the modal *qad* and aspectual morphology in MA. In Arabic classical grammar (Al-Muradi 1992; Al-Ansarie 1964), *qad* is treated as a particle that freely joins with perfective and imperfective VP complements.[3] In what follows, we illustrate the first interaction with the imperfective aspect, and then we explain the second interaction with the perfective aspect— the main focus of this paper.

1.1 *qad + imperfective*

The first type of interaction to be illustrated between the modal *qad* and aspect is with the imperfective, as in (3). When *qad* is anchored with the imperfective, it conveys that it is epistemically possible that an event will happen.

(3) ʕomar qad yi-sgie   z-zarʕ
     Omar qad 3.SG.M.-water.IMPFV. the-plants
     'Omar might water the plants (but I am not sure that he will complete it, or I am not

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[3]It is crucial to highlight a fact about the tense-aspect distinction in Arabic. Arabic has a unified system for tense-aspect (Comrie 1985; Fassi Fehri 2012). It employs a sophisticated verb structure to facilitate aspect and tense. For the purpose of coherence with the previous work on modal-aspect literature, we will follow the perfective and imperfective distinction in this paper.

sure that he will even start it).' (MA)

Omar in (3), for instance, is always busy but he agreed to do some housework. It is possible that he waters the plants. Notice that the event *qad water.MPFV. the plants* has not yet started, nor is it running during the speech time in (3). Importantly, it is true that a listener is uncertain of whether the event will take place or will be completed. Also, the above claim in (3) could be subject to this question: "Are you sure that he will water the plants?"

The speaker in examples where *qad* comes with an imperfective embedded clause as shown in (3) is not concerned about the completion of the event. It is possible to continue the above claim by saying: "but I am not sure that he will complete it, or I am not sure that he will even start it."

When the modal *qad* is removed from (3), the intuition that "I am not sure that" is not available— the epistemic reading is no longer there, as in (4).

(4)   Muna ti-ktub   l-waaʒib
           Muna 3.SG.F.-write.IMPFV. the-homework
           'Muna writes the homework.' (MA)

In MA, the imperfective without the modal *qad* is ambiguous between two readings. First, in (4), the sentence can refer to a habitual event of Muna's writing the homework, for example (everyday at 5 pm). Second, the sentence is about an event that is taking place at the moment of speech (Muna is writing right now). In both cases, an adverb of time can be used to clarify the reading that we want in a conversation.

By comparing (3) and (4), the epistemic possibility interpretation is straightforwardly visible when *qad* is present and followed by the imperfective, as presented earlier in (3). With imperfective, the speaker is always unsure about the completion of the eventualities or even the initiation of the eventualities.

The ambiguity that is obtained from the habitual event and the present contentuation does not involve a 'future' ambiguity. In MA, a prefix *ɦa-* refers to future events, and it is infelicitous with *qad*.

(5)   Muna ɦa-ti-ktub   l-waaʒib
           Muna FUT.-3.F.-write.IMPFV the-assignment
           'Muna will write the assignment.' (MA)

(6)   #Muna **qad** ɦa-ti-ktub   l-waaʒib
           Muna qad FUT.-3.F.-write.IMPFV the-assignment

                                                                     (MA)

To sum up, we have presented the epistemic possibility reading of the modal *qad* with an imperfective embedded clause. The coming section illustrates the multiple flavors of the modal *qad* with a perfective embedded clause.

1.2 Multiple flavors of *qad + perfective*

Interestingly, the modal *qad* can have a perfective embedded clause. In works of Arabic grammarians and linguists, it has been reported that *qad* displays ambiguity with the perfective (Al-Muradi 1992; Al-Ansarie 1964; Bahloul 2008; Fassi Fehri 2012). The first reading is introduced below:

(7)   Qad qaama   Zaydun
      qad stand.up.PFV.3.SG.M. Zayd
      'Zayd (has) just stood up.'   (Bahloul 2008: 73)

In (7), *qad* results in a reading according to which an event has happened in the recent past and is closer to present. This reading is called a 'temporal' reading.
   The second reading shows that an agent successfully completed the event, as in (8).

(8)   Muna qad katab-at   l-waaʒib
      Muna qad write.PFV.-3.SG.F. the-homework
      'Muna already wrote the homework.'   (MA)

In (8), the modal *qad* does not have the possibility interpretation. Rather, there is a kind of assertion that Muna completely wrote the homework. Importantly, it is not possible to cancel the claim by negation: "but she didn't", or "but I am not sure that she wrote it". We call this reading the 'already' reading which is an 'aspectual' reading. We have to emphasize that the 'already' reading is left for future research at the moment.
   The third reading of the modal *qad* is an 'indeed' reading (we follow Bahloul (2008) by using the same term), as shown in (9) and (10). The effect is one of certainty.

(9)   qad kaan y-uSallii
      qad was 3-pray
      'He was indeed praying.'   (Fassi Fehri 2012: 8)

Imagine there is a package that a DHL courier was supposed to pick up at Zayd's house. Zyad was praying when the DHL courier arrived. He was not able to answer, so the courier was not patient and left without picking up the package. Someone was wondering why Zyad did not open the door for the courier. A speaker would express the above claim if he saw Zyad or if Zyad himself reported what happened.[4] Example (9) conveys the speaker's certainty.

(10) Muna qad ʃaaf-at   θuʕbaan fi l-ħadeegah
      Muna qad see.PFV.-3.SG.F. snake   in the-garden
      'Muna indeed(#already) saw a snake in the garden.'   (MA)

Consider (10) in the following scenario: Gita and Paul were discussing the topic of having

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[4]Fassi Fehri (2012) did not provide a scenario for sentence (9). We try to generate a scenario for (9) to best fit our intuition about the modal *qad* in this case.

or seeing snakes in the backyard. Gita confirms the appearance of snakes in the backyard by citing a real incident that happened to Muna. With the use of *qad* in (10), Gita seems to be very sure about her statement.

The focus of this paper is on the epistemic certainty— the 'indeed' reading of *qad*— with a perfective embedded clause. With perfective, the modal *qad* entails a sort of high certainty due to available facts and evidence— though the type of evidence is not explicitly known. Al-Muradi (1992) nicely articulated the 'indeed' reading of *qad* with the perfective as a particle that entails reporting news or information, a 'reporting particle', for instance:

(11) kaaʔin-aat   faDaaʔ-y-ah   qad ðahar-at   fi New Jersey
       creature-3.PL.F. space-adj-3.SG.F. qad appear.PFV.-3.SG.F. in New Jersey
       'Flying saucers indeed (#completely/#already) appeared in NJ.'   (MA)

Native MA listeners will not doubt the speaker upon hearing the above claim since the modal *qad* is present. They may ask about the source of the news, which is not explicit in the case of *qad*. Their expected questions are: where did you read this news? how did you know?

It is important to discuss perfective examples without the modal *qad*, as in (13) in comparison to (12).

(12) ʕomar qad qaraʔ   ʔalf   laylah wi laylah
       Omar qad read.PFV.3.SG.M. one.thousand night and night
       'Omar already read *One Thousand and One Nights*.'   (MA)

In (12), a speaker claims that Omar has actually finished reading the novel of *'One Thousand and One Nights'* without skipping one chapter. The intuition of completeness results from the use of the modal *qad* with the perfective; our intuition agrees with the consensus in the literature (e.g. Bahloul 2008).

On the other hand, once the modal *qad* is removed from example (12), the notion of actual completeness is missing from (as in (13)); the listener may be skeptical about a speaker's claim.

(13) ʕomar qaraʔ   ʔalf   laylah wi laylah
       Omar read.PFV.3.SG.M. one.thousand night and night
       'Omar read *One Thousand and One Nights*' (but I am not sure if Omar completely finished the whole novel).'   (MA)

Let us examine another example. According to (14), a state of affairs of seeing a ghost happened before the speech time. The listener might be skeptical upon hearing this information and might say: "it might be your shadow or something else that looks like a ghost in the dark." The effect is very different from the type of the effect seen in (10), for example.

(14) Muna ʃaaf-at   ʒinnie fi l-badroom
       Muna see.PFV.-3.SG.F. ghost in the-basement
       'Muna saw a ghost in the basement.'   (MA)

After presenting the difference in meaning caused by changing the choice of aspect in the complement aspect choice of the modal *qad*, we address the following questions:

1. What is the relation between *qad* and aspect?
2. Do *qad* phenomena resemble the actuality entailments discussed in the literature on Hindi-Urdu (Bhatt 1999) and French (Hacquard 2006, 2009)?
3. Does perfective aspect cancel the epistemic modal component of *qad* in MA?

The fact that aspect contributes to the modal interpretation has initially recognized in Bhatt's PhD dissertation (1999). Other linguists became interested in the interaction between modals and aspect cross-linguistically, for example Hacquard (2006, 2009) in French and Italian; Mattheson, Davis and Rullmann (2007) in St'àt'imcet; and Piñón (2003, 2009) in English.

2. Previous works

The observations surrounding *qad* are reminiscent of the modal-aspect association investigated by Bhatt (1999), Hacquard (2006, 2014) and Piñón (2003, 2009). This section outlines two prominent studies in the field of relationship between modal-aspect. The first proposal is by Bhatt (1999), in §3.1 The second significant study is by Hacquard (2006, 2009), in §3.2.

2.1 Bhatt's observation

The fact that aspect can contribute to modal interpretations was initially recognized in Bhatt's PhD dissertation (1999).

In Hindi-Urdu, the root ability modal *sak* signals a generic interpretation in the presence of the imperfective suffix: *sak-taa*. The event need not be actualized in this case.

(15) Yusuf havaii-jahaaz uraa sak-taa   hai/thaa   (lekin vo havaii-jahaaz nahii
      Yusuf air-ship   fly Can-impfv be.rs/be.Pst (but   he air-ship   Neg
      uraa-taa   hai/thaa)
      fly-impfv be.Prs/   be. Pst.
      'Yusuf is/ was able to fly airplanes but he does not / did not fly airplanes.'
                              (Hindi-Urdu as cited in Bhatt (1999) on p.162)

With the perfective, Bhatt claimed that the root modal *sak* is an implicative verb like *managed to* that simply means an effort has been made to do a particular event. This configuration triggers actuality entailments. It is infelicitous to say: "Yusuf did not fly airplanes" after stating that he completed the event of flying airplanes.

(16) Yusuf havaii-jahaaz uraa sak-aa   (#lekin us-ne havaii-jahaaz nahii uraa-yaa)
      Yusuf air-ship   fly Can-pfv (but   he-erg air-ship   Neg fly-pfv)
      'Yusuf could fly the airplane, but he did not fly the airplane.'
                              (Hindi-Urdu as cited in Bhatt (1999) on p.162)

For Bhatt, two operators are proposed to account for the Hindi-Urdu *sak* modal. First, an '*ABLE*' operator maps to the perfective aspect. It entails the implicative "managed to" reading; the *ABLE* operator forces the actuality entailments interpretation. Second, to obtain an ability modal interpretation, a higher operator scopes over the *ABLE* base; it is a generic operator (GEN). Therefore the imperfective is immune from actuality entailments.

2.1.1 A critique of Bhatt

In this section we present some *qad* facts that are not captured by Bhatt's proposal. A preliminary comparison shows that it is impossible to treat the MA modal *qad* parallel to the Hindi-Urdu ability *sak*. The case of *qad* is totally different from the Hindi-Urdu *sak* modal.

First, the modal *qad* is free from any aspect markers in comparison to Hindi-Urdu *sak*. In the *qad* context, the embedded clause is the only one that is inflected; this predicts something about aspect position in the case of *qad*. If the embedded clause is inflected with aspect morphology, then we can say that aspect is below the modal *qad*.

In addition, the MA root modal *yi-gdar* shows greater similarity to Hindi-Urdu with respect to the ability modal. This seems to pattern like *sak*, but the case of *qad* is definitely different.

Inspired by Bhatt's work on the ability modal in Hindi-Urdu, Hacquard (2006, 2009) also found evidence in French and Italian where modals and aspect interact. In what follows, we summarize her proposal and evaluate it with respect to the epistemic modal *qad*.

2.2   Hacquard's contribution

We explore another work on the association between modal- aspect to solve the puzzle around *qad*, and it is Hacquard's (2006) PhD dissertation and later works by Matthewson, Davis, and Rullmann (2007) in St'àt'imcet; and Piñón (2003, 2009) in English. She acknowledged Bhatt's pioneering research on the modal *sak* in Hindi-Urdu; however, she has a different perspective on the basis of French and Italian data.

Hacquard (2006 and later 2009) assumed that the modal can have two positions relative to aspect phrase in the computation; the exact position of the modal is determined by the type of the modal— root or epistemic. If the type of the modal is root, then it is merged above the VP. The root modal combines with a property of events; this construction yields actuality entailments. If the type of the modal is epistemic, then it is merged above tense and aspect. In this case, the epistemic modal combines is immune from actuality entailments.

Part of Hacquard's (2006) machinery is a refinement of Kratzer's (1998) aspect lexical entry for the sake of invoking actuality entailments. Hacquard proposed merging an argument within the aspectual phrase; the kind of argument is a world pronoun variable. In this modified version, aspect quantifies over eventualities that are anchored to the world pronoun variable.

Based on the above argument, with root modals aspect has its own world of evaluation—the actual world. Aspect quantifies over the property of events. Notice that the property of events is anchored to the actual world. The intuition behind this is to preserve the exact characteristics of the property of events not only in the actual world but also across all worlds, and this is called 'Preservation of Event Properties' (Haqcuard 2006, 2009). This type of relativizing aspect to the actual world gives rise to actuality entailments.

With epistemic modals, the opposite modal- aspect effect is obtained. The epistemic modals scope over tense and aspect; they provide the aspectual phrase its world of evaluation. They also map the property of events into their accessible worlds. This modals-aspect configuration does not induce actuality entailments— readers may refer to Hacquard's (2006) PhD dissertation and (2009) for a detailed analysis.

2.2.1 Critique of Hacquard's proposal

Hacquard's proposal (2006, 2009) was designed for root modals in the French and Italian modal-aspect associations. The current section presents four crucial differences between the French and Italian data and the MA *qad*.

First, MA data reveal a surface difference already noted for Hindi-Urdu. Both French and Italian examples involve a perfective and an imperfective marker on the modal, as in:

(17)   Jean pouvait   soulever un frigo, mais il ne l'a   pas soulevé
       Jean could-IMPFV lift   a fridge, but   he not it has   lifted
                                                              (French, Hacquard 2014: 2)

(18)   Jean **a pu**   soulever un frigo, (#mais il ne l'a   pas soulevé)
       Jean has could(PFV) lift   a fridge, (#but   he not it has   lifted)
       Jean could lift a fridge, but he didn't lift it.   (French, Hacquard 2014: 2)

(19)   Gianni ha.voluto   parlare a Maria, (#a   non lo hafatto)
       Gianni want-past-PFV talk   to Maria, (#but not it do-past-PFV)
                                                              (Italian, Hacquard 2014: 15)

In contrast, *qad* is free from any aspectual markers in both the perfective and the imperfective. It is the embedded clause that bears aspectual markers.

(20)   ʕomar qad yi-sgie   z-zarʕ
       Omar qad 3.SG.M.-water.IMPFV. the-plants
       'Omar might water the plants.'   (MA)

(21)   ʕomar qad sagaa   z-zarʕ
       Omar qad water.PFV.3.SG.M. the-plants
       'Omar already watered the plants.'   (MA)

Second, based on the first difference presented in (20) and (21), aspect appears in a lower position than the modal *qad*. Specifically, the notion of actuality entailments is triggered when the perfective aspect is below the modal *qad* in (21). This fact predicts that MA actu-

ality entailments are acquired where the modal *qad* is above aspect, contrary to Hacquard's machinery for French and in Italian.

The above examples confirm that French, Italian and Arabic share one fact which is actuality entailments. However, French and Italian have a computation distinct from MA *qad*. It is impossible to treat all three languages under the same proposal stated by Hacquard (2006, 2009).

(22)   ModP   (MA)

      qad   TP

          T   AspP

             PFV/IMPFV   vP
                             water
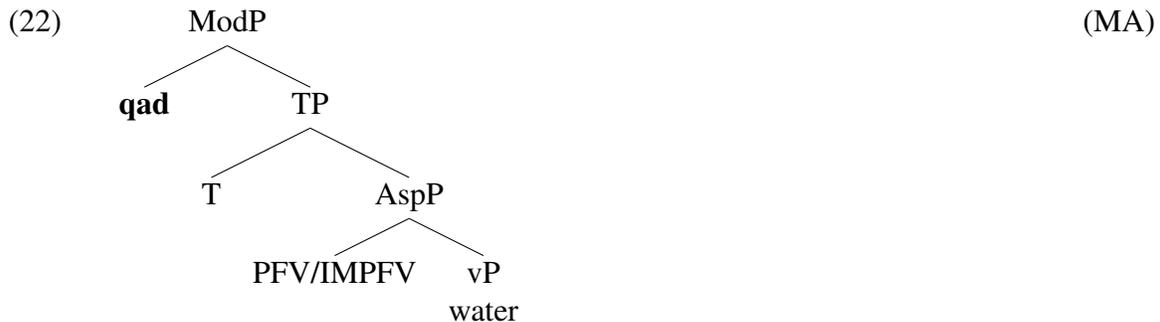
In (22), we present a preliminary view of the structural interaction between *qad* and the embedded clause.

Finally, the modal *qad* with the imperfective always refers to an epistemic possibility modal. These facts together indicate that we need a different proposal for the *qad* data.

3.   Back to MA phenomenon

The epistemic possibility *qad* modal requires a new analysis; epistemic *qad* with the perfective cannot be equated to other root ability modals in Hindi-Urdu, French or Italian as stated earlier in §3. Hence, we pursue a different approach from Bhatt (1999) and Hacquard (2006, 2009).

To solve the puzzle around epistemic *qad*, we start with the influential analysis of the epistemic modal found in the works of Kratzer (1977, 1981, 2012). We follow Kratzer's theory to compose a unified lexical entry of epistemic *qad* that can be computed with the two types of aspect— imperfective and perfective. Afterwards, we explore two possible proposals that correlate with the different aspectual propositions. The first proposal has a true epistemic possibility modal base (Kratzer 1977, 1981, 2012) analogical to the English possibility modals *may* and *might*. The second proposal, on the other hand, builds on an actuality operator proposed by Homer (2009).

In the Kratzerian framework two main ingredients—two parameters— are required to interpret epistemic modals. The first parameter is a conversational background that is related to the speaker's knowledge and beliefs, whereas the other one corresponds to expectations. Let us remember our toy example.

(23)   Muna katab-at   l-waaʒib
        Muna write.PFV.-3.SG.F. the-homework
        'Muna wrote the homework.'   (MA)

The first parameter defines the type of our conversational background. When a proposition like 'Muna wrote the homework' is joined with the modal *qad*, the interpretation of the sentence is based on the speaker's belief or evidence, the type of evidence in our case is not explicitly defined. This is what Kratzer (1981, 2012) called an 'epistemic conversational background', and it can be paraphrased as:

(24)   *In view of what is known...*   (Kratzer 1981: 45)

According to the theory spelled out by Kratzer, this function *f* is a parameter of interpretation. The function *f* identifies the worlds to be quantified over by providing a set of propositions. It maps the set of worlds into a set of propositions that are epistemically accessible. The intersection of the propositions in that set gives us the set of possible worlds that are epistemically accessible. Kratzer's second parameter ranks those worlds; it is called an 'ordering source' *g*. The parameter *g* selects the best worlds on the basis of a set of proposition; the strict ordering of the propositions is induced by $\leq_{g(w)}$ (Kratzer 1981, 2012, Portner 2009; and among others). Having defined the modal base for epistemic possibility modal *f* and the ordering source *g*, the lexical entry for the modal *qad* is inspired by Kratzer's work.

(25)   **[[qad]]** $^{g,\ w@}$ = λf. λg. λp. $\exists$ w' $\in$ MAX$_{g(w@)}$: ($\bigcap f$ (w$^{@}$): p(w')= 1

The above lexical entry works as follows: 'The modal base *f* identifies a subset of worlds that are epistemically accessible. The function of *MAX* is to select the best worlds of the modal base in which propositions of the ordering source hold. The modal existentially quantifies over the most ideal worlds of the modal base.'

To summarize, we propose a lexical entry for the epistemic modal *qad* inspired by Kratzer (1977, 1981, 2012). In the following sections, we employ this lexical entry in exploring two proposals to account for the different flavors of the epistemic modal *qad* with the perfective.

3.1   Actuality via domain-manipulation

In seeking to elucidate the multiple flavors of the epistemic modal *qad* with the perfective aspect, we establish our first proposal by adopting Kratzer's (1981, 2012) recent insights in recognizing the manipulation of the ordering source.

It has been argued (e.g. Kratzer 1981, 2012; Portner 2009; Peterson 2008) that manipulation of the ordering source can have consequences regarding intuition about quantificational strength. In some languages there is no lexical distinction between possibility and necessity. The distinction between a possibility modal and a necessity one collapses. The technical term for such modals is 'modals without duals'.

In modal context, the ordering source is a domain restriction for the set of the accessible worlds. For example, if the domain restriction includes only the closest worlds or a very narrowed set of best worlds, a necessity modal becomes 'weaker' in terms of strength. It behaves similar to a possibility modal. On the contrary, if the domain restriction is broad

the necessity modal becomes 'stronger'.

We aim to link ordering source manipulation to the interaction between *qad* and aspect. We assume that a 'strict' ordering source matches our intuitions of perfective aspect. We build on the intuition that perfective aspect leads to 'reportative' reading that signals that the speaker has reliable evidence of a complete event. Given perfective aspect, the ordering source will include a proposition *e* that is true in a world *w* only if all the evidence available in the actual world $w^@$ is available in *w*.

(26) $e=\{$ *w*: all the evidence available in $w^@$ is available in *w* $\}$

The proposition *e* can only be true in the actual world $w^@$. The actual world is the only world where all the evidence available in the actual world is indeed available— having the assumption that different worlds cannot be descriptively identified. By including the proposition *e* in the ordering source $g(w^@)$, the domain of quantification for the epistemic possibility modal *qad* becomes very much narrowed to one world= $\{w^@\}$.

If the quantificational claim is true, the event described by the embedded clause must actually take place. It is normal for the listener to ask "how do you know?" but the listener is not challenging the speaker. Consequently, this structure yields actuality entailments. We have to emphasize that necessity and possibility interpretations collapse here. Accordingly, the sentence will have the truth conditions below:

(27)   [[Qad [PFV. [w: Muna finished the homework in *w*]]$^{g,\,w@}$= 1iff $\exists w' \in \{w^@\}$ such that Muna finished the homework in w'

After establishing the connection between *qad*-perfective aspect and the narrowed ordering source, we need to account for the epistemic possibility *qad* with the imperfective in the embedded clause. With the imperfective aspect, the ordering source is not narrowed. Rather, the ordering source is broad; hence, the epistemic possibility interpretation of *qad* is available. Furthermore, necessity and possibility modals do not collapse here.

3.2   Actuality via operator

This section presents an alternative proposal to be explored in the analysis of the modal *qad* with aspect. To account for our novel data with *qad*, we propose 'an actuality entailment operator' (AE) in the case of the epistemic *qad* and the perfective aspect. We build this proposal in light of Homer's (2009) 'actuality entailment operator' (ACT) used for 'aspectual coercion'. As noted in Homer (2009), a stative predicate give rise to an actuality entailment with perfective in French, for instance:

(28)   la maison a coûté 100, 000 € (The house has cost €100, 000)
        'The house was bought for €100, 000   (Homer 2009: 6)

Homer (2009) proposed that given the fact that the perfective aspect requires 'bounded' eventualities, the properties of events have to be associated with actions. However, 'costs'

does not entail action or instantiation, but rather a stative predicate. As a result, a clash occurs between the perfective aspect requirement and the stative predicate in (29). This phenomenon of incompatibility between the perfective and the stative predicate leads to 'aspectual coercion' (Homer 2009; and Hacquard 2014).

To rescue this situation, the ACT is triggered to enrich the system (Homer 2009). This operator will take the stative predicate and return a bounded one to satisfy the perfective aspect selectional restriction. The ACT operator merges between the predicate of eventualities and the perfective aspect.

Homer further claimed that the ACT saves the aspectual clash occurring with French root ability modals. For him, ability modals are naturally stative and not bounded. They are unbounded in the sense that they do not require instantiation or action. The same clash that was encountered in (28) arises with the ability modal here. By adding an ACT operator to the system, the actuality entailment is derived.

Homer's proposal (2009) with the root ability modals captures counterexamples where the perfective does not necessarily yield actuality entailment, as in:

(29)   À plusieurs reprises, Olga a pu(ability) soulever un frigo, mais ne l'a pas fait.

(Homer 2009: 2)

In (29) above, on several occasions Olga was able to lift the fridge, but she did not. Actuality entailment cannot be derived here. Based on the ACT proposal, we assume that the operator is not available.

Inspired by Homer's (2009) *ACT* coercion, one could propose that an actuality entailment (AE) operator is present in the case of the epistemic possibility modal *qad* with perfective aspect. The function of the AE operator is to scope over properties of events. We present a proposal for the AE operator below.

(30) $[[\textbf{AE}]]^{w@} = \lambda P. \lambda e.\lambda w. P(e)(w) = 1 \wedge e$ has a counterpart with the same properties as in w' in $w^{@}$.

Example (30) requires that *e* has the *P* property in *w* and the same property in the actual world. This particular preservation property is inspired by Hacquard (2014).

(31)   **Preservation of Event Description (PED)**: for all worlds w_1, w_2, if e_1 occurs in w_1 and in w_2, and e_1 is a P-event in w_1, then e_1 is a P-event in w_2 as well. (Hacquard 2009: 298)

When the property of event corresponding to *Muna wrote the homework* combines with the *AE* operator we get the following property of events:

(32) $[[\textbf{AE Phrase}]]^{w@} = \lambda e.\lambda w.$ e is an event of Muna writing the homework in *w* $\wedge$ e has a counterpart with the same properties as in w' in $w^{@}$.

The actuality operator results in a property of events true of events only if they have matching events in the actual world. The property associated with perfective aspect to specify

completeness of the event time within the reference time.

(33)   **[[Aspect Phrase]]**= [[perfective]] ([[AE Phrase]]) = $\lambda t_i.\lambda w_s.\exists e.$ e is an event of Muna writing the homework in $w \wedge$ e has a counterpart with the same properties as in w' in $w^@$ and the event time of Muna writing the homework $\subseteq$ t.

Let us continue with the computation of example (4). The perfective aspect phrase is anchored with the past tense. As a result, the computation gives us a proposition that is true in a world if there is an event of Muna finishing the homework. This event matches an event in the actual world and has a running time included in the contextually salient past time.

(34) $\lambda w. \exists e.$ e is an event of Muna writing the homework in $w \wedge$ e has a counterpart with the same properties as in w' in $w^@$ and the running time of $e \subseteq$ t, where t is a contextually salient past time.

At this level, we need to combine the actualized perfective proposition that is anchored in the actual world to the possibility modal *qad* as in the structure below.

(35)   **[[qad]]** $^{g,\ w^@}$= $\lambda f. \lambda g. \lambda p. \exists$ w' $\in MAX_g(w^@): (\bigcap f(w^@): q(w')= 1$ ([[TP]])

(36)   [[[*qad* [Past [Perfective [AE [VP]]]]]]= 1 iff $\exists w' \in MAX_{g}(w^@):(\bigcap f(w^@): \exists e.e$ is an event of Muna writing the homework in *w'* and *e* has a counterpart with the same properties as in w' in $w^@$ and the running time of *e* $\subseteq$ *t*, where *t* is a contextually salient past time.

The epistemic possibility modal *qad* will have the usual quantificational force. The actuality operator, on the other hand, will ensure in its scope that there is an event with matching properties in the actual world. In this proposal, modality does not collapse, but we obtain an actuality entailment only with perfective aspect.

3.3   Summary

We offer an evaluation of the two proposals with respect to the multiple interpretations of the epistemic modal *qad* with the perfective in MA. The first proposal, which is actuality entailment via manipulation of the ordering source, seems more appealing than the AE operator one for the following reasons:

Without overloading the system with the AE operator, the narrowed ordering source is naturally anchored with the perfective aspect. We do not need an intervening operator between properties of events and perfective aspect. The modal quantificational force has only one actual world to scope over. This seems to adequately target the 'indeed' reading. However, more research is needed to allow for a proposal that targets the full range of readings. It may be that aspect coercion will play a role.

By manipulating the ordering source, we successfully answered our research questions stated in §2.2. We questioned the relationship between aspect and *qad*. MA data prove high correspondence between aspect and *qad*. The perfective embedded clause invokes actuality entailments while the imperfective always yields epistemic possibility. Neither reading is available without *qad*, as we have seen earlier in §2.

Finally, our findings also confirm the existence of a modal component with perfective. The type of reading we obtain is equivalent to a simple necessity due to a very restricted ordering source, illustrated in §4.1. For this reason, the modal component is not obvious. On the contrary, the broad ordering source with imperfective allows the epistemic possibility modal component to be very clear.

4.   Conclusion

Our research revealed an interesting correspondence between an epistemic possibility modal and aspect that has not as yet been noted or accounted for in the literature. This paper aimed at introducing an analysis without giving up the standard semantics of Kratzer's modal machinery and aspect. It contributes to a better understanding to epistemic modal particles that enter a genuine relationship with aspect. We established a dialogue between the perfective aspect and the epistemic modal *qad* in MA, making a contribution to our cross-linguistic understanding.

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