ON THE ACQUISITION OF ROOT AND EPISTEMIC MODALS IN BRAZILIAN PORTUGUESE[1]

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ABSTRACT: This paper investigates the acquisition of modal verbs based on the analysis of longitudinal data from two children acquiring Brazilian Portuguese. The theoretical framework is Kratzer's theory of modality (1977, 1981, 1991, 2012). Concerning lexical acquisition, Brazilian Portuguese modal verbs are acquired in a systematic way and following an order which considers the concept of quantificational force: the possibility modal *poder* is acquired first and then the necessity modals (first the strong necessity modal *ter que* and then the weak necessity modal *dever*) are acquired. Regarding the acquisition of the interpretations of modals, there is also a regularity: root modality is acquired earlier (and it is associated by children with modals *poder* and *ter que*) whereas epistemic modality appears latter (and it is associated with modal *dever*). This finding mirrors exactly what happens in other languages, suggesting that there must be an acquisitional path in the acquisition of modality: root modality emerges before epistemic modality. Furthermore, the analysis permits us to claim that that, in children's grammars studied here, the system of necessity modals is composed of verbs which are specialized in relation to the modal base they combine with: *ter que* is a strong necessity modal which combines with a circumstantial modal base whereas *dever* is a weak necessity modal which combines with an epistemic modal base.
KEYWORDS: Modal verbs; language acquisition; possible worlds semantics; Brazilian Portuguese.

INTRODUCTION

It is a fact that modal verbs in human languages can generally be associated with a variety of interpretations. This is also the case of Brazilian Portuguese (henceforth BrP), in whose adult grammar, modal verbs *poder*, *dever* and *ter que* can express different modal meanings. This property of modals makes them an interesting object of study for various areas of linguistic investigation: syntax, semantics, language acquisition etc. Modal verbs, specifically BrP modal verbs, also constitute the object of study of this paper. Adopting the theory of modality proposed by Kratzer (1977, 1981, 1991, 2012), the main aim of this study

is to investigate the development of these verbs in the speech of two Brazilian children acquiring BrP. The motivation for this investigation is the inexistence of studies focused on the acquisition of modals in BrP in a formal perspective.

Three are the questions I address in the paper. The first one relates to lexical acquisition, that is, how the modal verbs *poder*, *dever* and *ter que* develop in the grammar of children acquiring BrP. Two are the possibilities I want to investigate: (i) whether all BrP modals are acquired at once as a class, or (ii) whether each one emerges at a specific moment.

The second question has to do with the development of the interpretations of modals. Given that modal verbs can convey different interpretations, namely root interpretation and epistemic interpretation, two logical scenarios can be set for their acquisition: (i) root and epistemic readings are acquired at the same time, or (ii) root and epistemic readings are not acquired at the same time, instead, they emerge gradually. My aim is exactly to evaluate which of the two described scenarios better characterizes the development of modal verbs system in BrP.

Finally, the third question is related which the previous one and concerns the acquisition of modality in a cross-linguistic perspective. More concretely, I investigate – by comparing the results presented here with those reported in the literature – whether there is similarity between the acquisition of modal meanings in BrP and the acquisition of modal meanings in other languages.

As will be seen below, BrP modal verbs are not acquired at the same time and the appearance of these verbs in children BrP grammars follows a systematic order which is characterized by the acquisition of possibility modal followed by the acquisition of necessity modals. As for the interpretations of these verbs, it will be shown that there is also a pattern of emergence of modal meanings with root modality being acquired first. This result reveals a similarity between the order of acquisition of modality in BrP and other languages.

The paper is structured as follows. In section 1, the basic aspects of Kratzer's theory of modality are presented. In section 2, some features of the BrP modal verb system are presented. In section 3, previous work that focused on the development of modality in other languages are reviewed. In section 4, two Brazilian children's production data are described and analyzed. Finally, in section 5, the main findings of the paper are summarized and some questions for future research are pointed out.

1. KRATZER'S THEORY OF MODALITY

Modality is a linguistic category related with the expression of necessities and possibilities (Kratzer 1981, 1991; von Fintel 2006; Hacquard 2011). In natural languages, this category can be expressed by different linguistic forms, such as affixes, nouns, adjectives, adverbs, (auxiliary) verbs, impersonal constructions, conditional sentences and so on.[3] Restricting our attention to modal verbs, it is easy to see that these verbs can convey a great variety of modal meanings as it is the case of the semimodal *have to* in the examples below (borrowed from von Fintel 2006, p.2):

(1) a. It has to be raining.

    b. Visitors have to leave by six pm.

    c. The children have to go to bed in ten minutes.

    d. I have to sneeze.

    e. To get home in time, you have to take a taxi.

The modal in (1) signals a kind of necessary conclusion the speaker reaches based on her knowledge. For example, after seeing some people entering the room with wet clothes and umbrellas, she can conclude that it has to be raining. In this case, the modal expresses epistemic modality, the type of modal meaning or modal flavor related to possibilities and necessities in view of what is known or given the available evidence.

The modal in (2) conveys an obligation from the part of the visitors. For instance, taking into account the rules of a hospital, visitors have to leave by six pm. In this example, the modal expresses deontic modality, the kind of modal meaning which has to do with possibilities, necessities, permissions or obligations given a set of moral principles or given a body of laws or rules.

The modal in (3) describes, for example, what the children have to do in view of someone's desires. In other words, according to a person's desire, say her parents, it is necessary that their children go to bed in ten minutes. In this situation, the modal expresses

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[3] On the linguistic means of conveying modality in natural languages, see Kratzer (1981, 1991), von Fintel (2006), Portner (2009) and Hacquard (2011).

bouletic (also referred to as boulomaic) modality, the type of modal meaning concerning possibilities and necessities in view of a person's desires.

The modal in (4) denotes a necessity of the speaker in virtue of a particular circumstance, a material condition. In other words, in view of the current state of her nose, the speaker needs to sneeze. In this case, the modal expresses circumstantial (sometimes referred to as dynamic) modality, the kind of modal meaning associated with possibilities and necessities given a set of circumstances.

Finally, the modal in (5) describes what is necessary for the listener to do in order to achieve a goal. In this example, to get home in time (the goal), the listener have to take a taxi. In this case, the modal expresses teleological modality, the type of modal meaning which relates with the possible and necessary means in view of a particular goal to be accomplished.

Since Hoffmann (1966), it is common to find in the literature on modality a division of modals into two groups: epistemic modals and non-epistemic modals. The group of epistemic modals contains modal verbs which convey epistemic modality whereas the group of non-epistemic modals includes modals which express deontic, bouletic, circumstantial/dynamic, teleological or other type of modal flavor. All these non-epistemic modals are collectively referred to as root modals. Based on this standard classification, it is possible to say that the modal *have to* in the example (1a) is an epistemic modal (or that it has an epistemic interpretation) and that the modal in the examples (1b-e) is a root modal (or that it has a root interpretation). I will adopt this two-way distinction throughout this paper.

An immediate question raised by this variety of interpretations a modal verb can convey has to do with the source of all these interpretive possibilities. Regarding this issue, Kratzer (1977, 1981, 1991, 2012) proposed that the multiplicity of interpretations associated with a modal verb is the result of the interplay of the lexical content of this verb with contextual information.

As for the lexical content of modals, Kratzer assumes that they are neither lexically ambiguous, nor polysemous, nor homophones. Instead, she claims that each modal (in all its uses) corresponds to just one verb with a single meaning. Relying on a possible worlds semantics[4], Kratzer analyzes modals as quantifiers over worlds. As quantifiers, these verbs

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[4] Portner (2009:21-22) defines possible worlds as follows:

> The notion of possible world goes back to the work of Leibniz and plays an important role in modern logic and semantics. A possible world is a complete way the universe could be throughout its history. For example, our universe (the "actual world") is a possible world. There are other possible worlds which are like our world except that some minor details is changed; perhaps it's .0001 degree colder in London today. Other worlds involve major changes. Perhaps dinosaurs never went extinct; there are lots of

can be either existential quantifiers (possibility modals) or universal quantifiers (necessity modals). This is, according to Kratzer, the core lexical content that a modal verb has and it corresponds to the concept of *modal force*. For example, in all the sentences in (1), *have to* is a necessity modal which universally quantifies over a set of possible worlds.[5]

The role of the context of utterance in Kratzer's theory of modality can be explained by looking at the following example:

(2) John must be at school.

This sentence is built up from the combination of *must* (a modal verb whose quantificational force is universal) with the sentence *John be at school.* As it stands, the proposition expressed by the sentence *John must be at school* should be true in all possible worlds; in other words, this proposition should be true if and only if it is the case that John is at school in all possible worlds. However, because of the multitude of possible worlds, there will be at least one possible world in which the proposition expressed by *John be at school* is false. This will make the proposition expressed by (2) to be necessarily false.

This problem is created by the fact that all the possible worlds are under consideration when evaluating the truth of the proposition expressed by sentence (2). A way to circumvent this difficulty is to restrict the nature of the possible worlds in which the proposition is evaluated. In Kratzer's approach, this is done through the context of utterance, which will provide a (first) conversational background, called *modal base*, which restricts/determines the set of accessible possible worlds, the worlds in which the proposition is true. For example, the sentence (2) can be uttered against two different conversational backgrounds, as (3) illustrates:

(3) a. *In view of what is known / In view of available evidence*, John must be at school.
    b. *In view of what his parents' orders*, John must be at school.

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different possible worlds realizing this general scenario. Still others never had much to do with our world at all. For example, there are possible worlds in which two elementary particles exist, and time is circular, with those two particles orbiting each other once for each cycle of time. Perhaps some possible worlds are not even conceivable by humans, but happily if there are such worlds, they can safely be ignored by linguists.

[5] English modals *must*, *should* and *would* are other examples of necessity modals. Verbs such as *can*, *could*, *may* and *might* are examples of possibility modals.

The role of the *in view of* phrase is to make explicit the relevant modal bases. Due to their presence it is easy to understand that (3a) is evaluated against a modal base which takes into account the speaker's knowledge or the evidence available to her, and that (3b) is evaluated against a modal base which takes into consideration material conditions, relevant circumstances or contextually identified facts. The first modal base is called epistemic modal base and the second one is called circumstantial modal base. According to Kratzer, these are the two types of modal bases that exist.

In the examples in (3), there is no context-dependency for the identification of the intended conversational backgrounds (modal bases) once this identification was made explicitly by linguistic means (the *in view of* phrase). Nevertheless, it is perfectly possible to use the sentence (2) with the *in view of* phrase missing. In this situation, the identification of the conversational background is completely context-dependent and there will be informational clues in the discourse flow that will guide the identification of the relevant conversational background. For example, the sentence (2) can be used in a context where the interlocutors are talking about where John is at the time of their conversation. They will be discussing known facts related to John and his habits: that John is not at home at that time, that he likes to study, that he never misses classes, that it is time of classes and so on. In this case, the context of utterance will provide enough information to the interlocutors to realize that the sentence must be evaluated against an epistemic modal base.

Once the entire set of possible worlds is restricted to subset of it (i.e., the subset of the only relevant possible worlds, those worlds which will be quantified over by the modal) based on a relevant (epistemic or circumstantial) modal base, this subset will be further restricted by another conversational background called *ordering source*. The role of the ordering source is to order/rank the possible worlds in the modal base according to a degree to which they realize a particular ideal.[6] Some ordering sources are presented below:

(4) Ordering sources

    a. *Stereotypical*: ordering source which will "rank worlds according to how close they come to the normal course of events in the world of evaluation, given a suitable normalcy standard" (Kratzer 2012: 39).

    b. *Bouletic*: ordering source which will order worlds taking into account wishes.

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[6] In the framework proposed by Kratzer (1981, 1991, 2012), this is the *double relativity of modals* and corresponds to the fact that modals are relative to two conversational backgrounds: they are relative to a modal base and to an ordering source.

c. *Circumstantial*: ordering source which will rank worlds in relation to some circumstances, facts.

d. *Deontic*: ordering source which will order worlds taking into consideration a set of laws, rules, regulations or moral principles.

e. *Teleological*: ordering source which will rank worlds based on certain goals.

As for the combination of modal bases with ordering sources, epistemic modal bases typically combines with a stereotypical ordering source[7], whilst circumstantial modal bases are compatible with a wider variety of ordering sources: bouletic, circumstantial, deontic, teleological.[8] The difference between epistemic and root interpretations is a reflex of modal base: an epistemic modal base gives rise to an epistemic interpretation whereas a circumstantial modal base gives rise to a root interpretation. All the root flavors (bouletic, circumstantial, deontic, teleological and others) are the result of the combination of a circumstantial modal base with a specific ordering source. As can be seen, the interplay between modal bases and ordering sources results in the different types (or flavors) of modality.

Hacquard (2011: 1495) sums up Kratzer's theory of modality in the following way:

> [...] in a Kratzerian system, a modal is a quantifier over possible worlds, restricted by a **modal base** (*circumstantial* or *epistemic*), which returns a set of accessible worlds, which can then be ordered by an **ordering source**, to yield the most ideal worlds of the modal base. Both modal bases and ordering sources are contextually determined (when not overt). This allows for a single lexical entry for *must* and for *can*, and their counterparts in various languages, which differ only in **force** of quantification (universal vs. existential).

Having presented the essential aspects of the framework proposed by Kratzer, in the next section I will describe some properties of BrP modal verbs.

2. BRAZILIAN PORTUGUESE MODAL VERB SYSTEM

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[7] Actually, according to Hacquard (2011: 1495), epistemic modal bases "combine with ordering sources related to information: what the normal course of events is like (stereotypical ordering source), reports, beliefs, rumors, etc".

[8] Kratzer (1981, 1991, 2012) presents a formalization of modal bases and ordering sources. For simplicity's sake, I omit it here and refer the reader interested in the technical details of the proposed formal analysis to Kratzer's papers.

The modal verb system[9] of colloquial Brazilian Portuguese is composed basically of three verbs: *poder*, *dever* and *ter que*.[10] Taking into account their morphological selection, these verbs select for an uninflected infinitive as complement[11]:

(5) a. As crianças podem brincar / *brincarem / *brincando / *brincado no parque.

   The children $\text{PODER}_{\text{PRS.3.PL}}$ $\text{play}_{\text{U-INF}}$ / $\text{play}_{\text{I-INF}}$ / play_{GER} / $\text{play}_{\text{PART}}$ in-the park

   'The children can play in the park'

b. As crianças devem brincar / *brincarem / *brincando / *brincado no parque.

   The children $\text{DEVER}_{\text{PRS.3.PL}}$ $\text{play}_{\text{U-INF}}$ / $\text{play}_{\text{I-INF}}$ / play_{GER} / $\text{play}_{\text{PART}}$ in-the park

   'The children must play in the park'

c. As crianças têm que brincar / *brincarem / *brincando / *brincado no parque.

   The children $\text{TER-QUE}_{\text{PRS.3.PL}}$ $\text{play}_{\text{U-INF}}$ / $\text{play}_{\text{I-INF}}$ / play_{GER} / $\text{play}_{\text{PART}}$ in-the park

   'The children have to play in the park'

In relation to their morphological constitution, *poder* and *ter que* have a full morphological paradigm whereas the verb *dever* has a defective paradigm where the indicative perfect past form is missing[12]:

(5) *Eu devi aceitar o convite.

   I $\text{DEVER}_{\text{IPP.1.SG}}$ $\text{accept}_{\text{INF}}$ the invitation

Considering their modal force, *poder* is an existential quantifier over possible worlds (possibility modal) whereas *dever* and *ter que* are universal quantifiers over possible worlds

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[9] In this paper, I will make reference to BrP modals simply as "modal verbs". The use of this neutral terminology is a way to avoid entering the discussion on the syntactic status of Portuguese modals (i.e., whether they are main verbs or auxiliaries). This constitutes a matter of debate I will not go into in this paper because that would take me too far afield. The interested reader can see the following literature on the topic: Lobato (1975), Macedo (1972), Pontes (1973), Miranda (1975), Burckhardt (1977), Longo (1990), Gonçalves (1996), Serrone (1992), Lunguinho (2005, 2011), Ferreira (2009).

[10] In BrP there is variation between *ter que* (literally 'have that') and *ter de* (literally 'have of'). The modal *ter que* is the variant most commonly used in spoken language whereas *ter de* is the variant most commonly used in written language. On this variation, see Barros (2012).

[11] The abbreviations used in glosses are the following: U-INF – uninflected infinitive; I-INF – inflected infinitive; INF – infinitive; GER – gerund; PART – participle; PRS – indicative present; IPP – indicative perfect past, IIP – indicative imperfect past; 1 – first person; 3 – third person; SG – singular; PL – plural.

[12] On the defectivity of modals, see Stowell (2004).

(necessity modals). As for their modal flavors, these verbs distribute as following. *Poder* can convey both epistemic and root modalities[13]:

> (6) a. O seu vizinho pode ser um ladrão de banco.   (epistemic reading)
>
>   The your neighbor PODER$_{PRS.3.SG}$ be$_{INF}$ a robber of bank
>
>   'Your neighbor may/might be a bank robber'
>
> b. Podia parar de chover logo.[14]   (bouletic reading)
>
>   PODER$_{IIP.3.SG}$ stop$_{INF}$ of rain$_{INF}$ soon
>
>   'It could stop to rain soon'
>
> c. O João pode vencer você no jogo de xadrez   (circumstantial reading)
>
>   The João PODER$_{PRS.3.SG}$ beat$_{INF}$ you in-the play of chess
>
>   'João can beat you in chess'
>
> d. A Maria pode ver televisão até 11 da noite.   (deontic reading)
>
>   The Maria PODER$_{PRS.3.SG}$ watch$_{INF}$ television until 11 of-the night
>
>   'Maria can watch television until 11 p.m.'
>
> e. Para chegar lá, eles podem ir a pé.   (teleological reading)
>
>   To arrive$_{INF}$ there, they PODER$_{PRS.3.PL}$ go$_{INF}$ on foot
>
>   'To get there, they can go on foot'

Similarly to *poder,* modal verb *dever* can also convey both epistemic and root modalities:[15]

> (7) a. Deve ter alguém na minha casa agora.   (epistemic reading)
>
>   DEVER$_{PRS.3.SG}$ have$_{INF}$ somebody in-the my house now
>
>   'There must be somebody at my home now'
>
> b. Amanhã devia ser feriado.   (bouletic reading)
>
>   Tomorrow DEVER$_{IIP.3.SG}$ be$_{INF}$ holiday
>
>   'It could be holiday tomorrow'
>
> c. As crianças não devem mentir para os pais.   (deontic reading)

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[13] On other readings associated with BrP modal verb *poder*, see Lobato (1984).

[14] For a thorough discussion of the interpretation of desire associated with *podia* as well as semantic similarities and differences between *pode* and *podia* in BrP, see Pires de Oliveira & Pessoto (2010) and Pessoto (2011a,b).

[15] In Scarduelli (2011) the reader will find a detailed discussion of some interpretive possibilities for *deve* and *devia* in BrP.

The children not DEVER_{PRS.3.SG} lie_{INF} to the parents

'Children must not lie to their parents'

d. Para evitar cáries, a Ana deve escovar os dentes.   (teleological reading)

To prevent_{INF} cavities, the Ana DEVER_{PRS.3.SG} brush_{INF} the teeth

'To prevent cavities, Ana must brush her teeth'

Finally, modal verb *ter que* can convey only root modality:

(8) a. #O mordomo tem que ter matado a convidada.   (epistemic reading)

The butler TER-QUE_{PRS.3.SG} have_{INF} kill_{PART} the guest

'The butler has to have killed the guest'

b. Eu tenho que passar nessa prova.   (bouletic reading)

I TER-QUE_{PRS.1.SG} pass_{INF} in-this test

'I have to pass this test'

c. O Pedro tem que espirrar.   (circumstantial reading)

The Pedro TER-QUE_{PRS.3.SING} sneeze_{INF}

'Pedro has to sneeze'

d. Todos têm que desligar os telefones celulares.   (deontic reading)

All TER-QUE_{PRS.3.PL} turn-off_{INF} the cell phones.

'Everyone has to turn off the cell phone'

e. Para chegar a tempo, temos que sair agora.   (teleological reading)

To arrive_{INF} on time, TER-QUE_{PRS.1.PL} leave_{INF} now

'To arrive on time, we have to leave now'

Based on the data presented above, one can conclude that *poder*, *dever* and *ter que* are compatible with a circumstantial modal base and, from these verbs, only *poder* and *dever* are also compatible with an epistemic modal base. The fact that *ter que* is not compatible with an epistemic modal base is not an exclusive property of this verb. Von Fintel (2006) has already noticed such a fact involving English modal verb *might*, which is specialized for combining only with an epistemic modal base. In order to explain the incompatibility of *ter que* with an epistemic modal base, I assume with Pires de Oliveira & Scarduelli (2008: 225) that a sentence with this modal in BrP cannot convey epistemic modality because it "does not express the result of inferential reasoning based only on knowledge already acquired by the

speaker, but is either the result of an inspection of the world or the pure expression of the desire of the speaker" (translation mine).

Paying attention to necessity modals, one may notice that these verbs overlap in the expression of root modality. Would they be synonymous? According to the analysis put forth in Pires de Oliveira & Scarduelli (2008), *dever* and *ter que* are not synonymous because they do not express the same type of necessity:

> […] *deve* expresses a weak necessity, because it leaves alternatives open […] *tem que*, by its turn, expresses a strong necessity, because it leaves no alternatives.
>
> […] saying that *ter que* indicates a strong necessity is to understand that the proposition is assessed taking into account only that worlds closest to an ideal. As there are no other closer worlds, there are no alternatives and hence there is no comparison between worlds. *Dever* leaves open the possibility of there being other worlds which are in a sphere not as close to the ideal world, thus admitting alternatives, and establishing a comparison. This is a case of weak modality, as defined by Kratzer.
>
> (Pires de Oliveira & Scarduelli, 2008: 227; 228-229 – translations mine).

In other words, although *dever* and *ter que* are necessity modals which can combine with a circumstantial modal base, they differ as to the strength of the necessity each one convey: *dever* expresses a weak necessity whereas *ter que* expresses a strong necessity.[16]

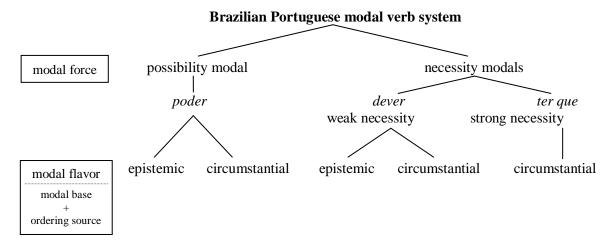The properties of BrP modals presented so far can be summarized in the following Figure:

Brazilian Portuguese modal verb system

modal force — possibility modal — necessity modals

poder — *dever* weak necessity — *ter que* strong necessity

modal flavor (modal base + ordering source) — epistemic — circumstantial — epistemic — circumstantial — circumstantial

Figure 1: Semantic properties of Brazilian Portuguese modal verbs

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[16] Due to space restrictions, I will not review the arguments Pires de Oliveira & Scardelli (2008) present in favor of their proposal and I will assume that the intuition behind their analysis is essentially correct. The interested reader can refer to Pires de Oliveira & Scardelli (2008) and Scardueli (2011) for details.

Once presented some basic properties of BrP modal verb system, in the next section, I will briefly review the results of some studies on the acquisition of modality in other languages as an attempt to support the discussion to be made in section 4.

3. THE ACQUISITION OF MODALS: PREVIOUS STUDIES

The purpose of this section is to present the results of some studies on spontaneous production of modal verbs in child language. These studies focus on: a) the age at which children begin to use modals and b) the interpretations associated with these verbs (root or epistemic).

Regarding the production of modals, it has been noticed that a striking feature of children's speech (in the period of more than one word) is the total absence of modal verbs (cf. Brown 1973, Hyams 1986, Aldridge 1989, Radford 1995, Guasti 2002). Still on the lack of modal verbs in children's speech in this period, studies on imitative speech (Brown & Frazer 1963, Brown & Bellugi 1964, Ervin-Tripp 1964) showed that children routinely omit these verbs when they are asked to repeat a sentence that contains them.

On the emergence of modals, researchers are unanimous in pointing the age of 2 years old as the moment when these verbs appear in the speech of children acquiring English (Kuczaj & Maratsos 1975, Shepherd 1982, Radford 1995). Becker (1998) reported that the first use of a modal verb by a child acquiring German occurs at 2;02.21.

As I have said above, studies on production also bring information about the interpretation associated which each modal verb. On this topic, there is unanimity in pointing out the root interpretations as the first interpretations that are associated with modals (Wells 1979, Stephanie 1986, Aksu-Koç 1988). The epistemic interpretation appears later, around the period between 3 and 5 years of age (Stephanie 1986).[17]

On the basis of these findings, this study addresses the following questions concerning the acquisition of BrP modals:

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[17] Papafragou (1998) presents a review of studies on acquisition of modal verbs and modality which are based both on naturalistic/longitudinal and experimental data.

- Are there stages in the acquisition of modals in BrP or are these verbs acquired all at once, as a class?
- How are the root and the epistemic interpretations of modals acquired?
- Is there similarity between the acquisition of modality in BrP and in other languages?

Since there are no studies on the acquisition of modals in BrP in a formal perspective, as far as I know, this paper is therefore a first attempt to explore the acquisition of modality and modal verbs in BrP in a formal framework. In the next section, I will present naturalistic data from two children acquiring modal verbs in BrP and, on basis of these data, I will address the issues raised above.

4. ACQUIRING MODAL VERBS IN BrP

In this section, I present the data which will be used to map the acquisition of modal verbs in BrP. Before presenting the data and the analysis, I will start by discussing some important methodological issues.

The corpus analyzed in this paper consists of naturalistic data from two monolingual female children (*R* and *L*) acquiring BrP as their first language.[18] Data from *R* comprise 64 sessions audio-recorded from 1;02 to 4;10 years of age and data from *L* comprise 106 sessions also audio-recorded from 1;04 to 4;11 years of age.

The following Table shows, for each child, the number of sessions divided by age:

Child	Age	Number of sessions
R	1;02.11 – 1;11.12	22
	2;00.05 – 2;10.14	29
	3;00.07 – 3;04.15	11
	4;09.21 – 4;10.06	2
L	1;04.18 – 1;11.09	13
	2;01.25 – 2;04.23	6
	3;00.09 – 3;07.28	27
	4;05.07 – 4;11.25	57

Table 1: Corpus – number of sessions divided by age

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[18] *R*'s data are part of the *Projeto de Aquisição da Linguagem* of the Universidade Estadual de Campinas, and *L*'s data are part of the *Projeto de Aquisição do Ritmo* of the Universidade de São Paulo.

Once presented these preliminary remarks concerning the source of the data as well as their organization, I will describe the data relative to the production of modal verbs in *R* and *L*'s speech.

4.1 MODAL VERBS IN *R*'S SPEECH: PRODUCTION AND INTERPRETATIONS

Modals appear early in the *R*'s speech. At 1;11.12 she uses the first modal, *poder*, in a question.

(9) Situation: *R.* is playing with an interviewer (I).

    R: Vo(u) tira(r).[19]

      'I will remove'

    R: ***Pode*** tira(r)?

      'May I remove?'

    I: Pode!

      'Yes, you may!'

As can be seen from the situation, *R* asks for permission to remove something from somewhere. In this case, *poder* has a deontic interpretation (i.e., permission).

The second modal that emerges in *R*'s productions is *ter que* on 2;05.15:

(10) Situation: *R* is playing with toys.

    R: ***Tem que*** fica(r) quietinho.

      'You have to stay quiet'

    R: De(i)xa eu fala(r) alô, alô.

      'Let me say hello, hello.'

    R: Alô? Alô?

      'Hello? Hello?'

    R: Quem fala?

      'Who are talking?'

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[19] Parentheses are used here to indicate that a word is incomplete. The omitted material is within parentheses.

In this example *R* is playing alone with toys and in her play she uses the sentence with modal *ter que*. She intends to make a call and asks to her possible interlocutor to stay quiet. In this scenario, *ter que* can be associated with a deontic interpretation (an obligation or a necessity) once what is relevant to the interpretation of the modal is a set of rules of behavior, including one that states that when one person is talking on the phone, others must be silent.

At 2;06.08, *ter que* appears in *R*'s sentences with another interpretation:

(11) Situation: *R* and her mother (M) are talking about going to the club.

    R: **Tem que** paga(r) dinheiro pá i?

      'One has to pay money to go?'

    M: Paga(r) dinheiro prá ir no clube?

      'To pay money to go to the club'

    R: É.

      'Yes'

R asks whether people are obliged to pay in order to go to a club. In this context, *ter que* is associated with a teleological interpretation because, in this case, *R*'s question makes a relation between what is required (the necessity of payment from the part of people) given a certain goal (to go to the club).

Ter que appears associated with a third meaning at the age of 2;06.12:

(12) Situation: *R* is playing with a typewriter and her mother is around.

    M: O que (vo)cê vai faze(r)?

      'What are you going to do?'

    R: **Tem que** pô(r) um papel aqui.

      'One has to put a piece of paper here'

    M: Pra escreve(r)?

      'To write?'

    R: É.

      'Yes'

In this situation, the modal receives a bouletic interpretation and the sentence expresses a desire: *R* wants her mother to put paper in the typewriter.

At the age of 2;07.02, *ter que* is used to express another modal meaning:

(13) Situation: *R.* is talking to her mother.

    R: Ai! **Tem que** costulá sua calça. Óia!

      'Ah! You have to sew your paints. Look!'

    R: Tá fulada

      'It's stuck'

    M: Tem memo.

      'I really have to sew it'

In this situation, *R* says that her mother's pants must be repaired/sewn and the justification she gives for her claim is based on the physical state of her mother's pants. The modal *ter que* in this example has a circumstantial interpretation because what is taken into account to its interpretation is a fact of the world, namely, the fact that the pants of *R*'s mother are stuck.

At this very same age, the third modal, *dever*, appears:

(14) Situation: *R* is talking to her mother.

    R: Quem esqueveu lá na lam, no peito da lâmpada?

      'Who has written near the lamp?'

    M: Quem será, hein?

      'Who will be, huh?'

    R: **Deve** tê a D.

      'It **must** have been D.'

    M: Deve tê a D. Eu acho que não.

      'It must have been D. I don't think so'

    R: Eu acho que não.

      'I don't think so'

    R: (baixo) **deve** tê eu ó!

      '(loudly) it **must** have been me, look!'

    M: Ééé! Deve tê o cê memo.

      'Yees! It must really be you'

In this last example, the dialogue centers around discovering who had written near the lamp. The author of the writings near the lamp, according to *R*, should be *D*, her sister. Her mother did not believe in *R*'s story and, because of this, *R* tells the truth and reveals that she is the author of the writings. As can be seen, the reasoning behind this conversation is strongly based on evidences or on pieces of information *R* and her mother know about the writings near the lamp. Given this fact, *dever*, in this situation, is associated with an epistemic interpretation.

The above data illustrate the modals found in *R*'s productions and all the interpretations conveyed by them. The Table below presents the number of occurrences of each modal verb in *R*'s speech (divided by age) and the interpretations associated with each one of them. On the meanings conveyed by modals in *R*'s data, I will not detail all the interpretations found in the corpus and I will make reference to them using the simpler classification which differentiates epistemic modals and root modals (non-epistemic).[20]

R's corpus	
Age	**Modals: occurrences and meanings**
1;02.11 – 1;11.12	*Poder*ROOT: 15
2;00.05 – 2;10.14	*Poder*ROOT: 44 *Ter que*ROOT: 8 *Dever*EPISTEMIC: 2
3;00.07 – 3;04.15	*Poder*ROOT: 13 *Ter que*ROOT: 18 *Dever*EPISTEMIC: 1
4;09.21 – 4;10.06	*Poder*ROOT: 5 *Ter que*ROOT: 3

Table 2: Modals in *R*'s speech – number of occurrences and meanings

Table 2 shows that *poder* is the modal verb most used in *R*'s production (77 times), followed by *ter que* (29 times) and by *dever* (3 times). Concerning modal *dever*, it appears around 2 years old, remains up to 3 years old and disappears by the age of 4 years old. I analyze this disappearance of *dever* in *R*'s corpus as a reflex of the scarcity of sessions (only two sessions) relative to the age of 4 years old.

In relation to the interpretations of each modal, we see that *ter que* appears with its unique interpretation, namely, root. Regarding modals *poder* and *dever*, which in adult language can be associated with both root and epistemic interpretations, the facts are the

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[20] On this classification, see Section 1.

following: a) in all its 77 occurrences, *poder* is understood as a root modal; b) in all its 3 occurrences, *dever* is an epistemic modal and, consequently, c) in the sample, there are data showing neither epistemic *poder* nor root *dever*.

In the next section I will present the data from the second child

4.2 MODAL VERBS IN *L.*'S SPEECH: PRODUCTION AND INTERPRETATIONS

The first modal verb which appears in *L*'s speech is *poder*, at age of 3;00.23:

(15) Situation: *L* is playing with her mother

    L: Eu ***podo*** pisar aqui mãe?

      'May I step here, mom?'

    M: Pode, pode pisa(r) sim, *L*.

      'Yes, you may step, *L*'

As can be seen from the dialogue, *L* asks permission to step somewhere. In this case, the interpretation associated to this instance of *poder* is deontic.

The second modal appears in *L*'s productions at 3;01.07 and is *ter que*:

(16) Situation: *L* is playing with her mother.

    M: Muito bem, são vinte cubos!

      'All right, there are twenty cubes!'

    L: Agora, aqui.

      'Now, here.'

    M: O quê, *L*?

      'What, *L*?'

    L: Aqui ***tem que*** faze(r).

      'Here, one has to do.'

    M: Quer fazer o quê, *L*?

      'What do you want to do, *L*?'

One may notice that *L* expresses her desire: she wants to do something or she wants her mother to do something. This analysis is supported by the fact that, at the last part of the

excerpt, her mother uses the volitive verb *querer* ('to want') to translate the child's *ter que*. In this case, *ter que* has a bouletic interpretation.

Epistemic *dever* appears at 3;01.07:

(17) Situation: *L* and her mother are playing with a puzzle.

    M: Você tem que olhar o desenho lá pra vê se você tá fazendo certo.

      'You have to look at the picture in order to see if you are doing it right'

    M: O desenho é teu guia, *L*, tá bom?

      'The picture is your guide, *L*, ok?'

    L: Eu botei xxx até esse aqui.[21]

      'I put xxx even this here'

    L: Esse aqui ***deve*** se(r) o do leão, mãe.

      'This here must be that of the lion, mom'

    M: Calma, a mamãe tá tentando fazer o leão pra você.

      'Be calm, mommy is trying to do the lion for you'

In the example, mother and daughter are engaged in a task of assembling a puzzle. *L*'s use of *dever* takes into account just the evidence she has at that moment, namely, the picture showing how the puzzle must be at the end. Taking into account what she knows about the final shape of the puzzle, *L* concludes that the piece she recognized makes part of the picture of the lion. In this case, *dever* has an epistemic interpretation.

At the age of 3;09.30, *L* uses modal *ter que* in a circumstantial interpretation:

(18) Situation: *L* is talking to her mother

    L: O(lha)...queb(r)o(u) aqui.

      'Look...it has broken here'

    L: Que(r) ve(r)?

      'Do you want to see?'

    L: Agora ***tem que*** conserta(r) xxx.

      'Now it has to be fixed xxx'

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[21] The symbol xxx is used to show that it is impossible to hear or to understand what the speaker is saying.

In this dialogue, the sentence with modal *ter que* must be interpreted taking into consideration the fact that there is something which is broken and this broken thing has to be fixed. Because the interpretation of this sentence is based in a fact of the world, a circumstance, the modal expresses a circumstantial modality.

This modal verb is also used with another interpretation at the age of 3:10.21:

(19) Situation: *L* and her mother are drawing and coloring squares

 M: Vai ficar super bonito, *L*, quando a gente colorir tudo.
  'It is going to be very cute, L, when we color everything'

 M: Já pensou?
  'Just think!'

 L: A gente **tem que** colorir tudo tudo pa(ra) ficar bonito.
  'We have to color everything to make it/them beautiful'

In this example, *L* has a particular goal in mind, which is to make her drawings become beautiful, and uses the sentence with modal *ter que* to explain to her mother what they have to do in order to achieve this goal. In this case, the modal *ter que* has a teleological interpretation.

Ter que also appears with a deontic interpretation at 3:10.28:

(20) Situation: *L* and her mother are playing with play-dough

 L: Fecha seu olho! Fecha seu olho!
  'Close your eyes! Close your eyes!'

 M: Vo(u), vo(u) fecha(r).
  'I'm going, I'm going to close'

 M: Já fechei.
  'I've already close my eyes'

 L: Sabe porque xxx **tem que** fecha(r) seu olho?
  'Do you know why you have to close your eyes'

 M: Por quê?
  'Why?'

 L: Porque ela, ela é surpresa.
  'Because it, it is a surprise'

In this situation, when *L* tells to her mother that she had to close her eyes because she was preparing a surprise, the child presents a fundamental information for interpreting *ter que* as a deontic modal, as an obligation from the part of *L*'s mother. Since deontic modality has to do with laws and rules, this explanation makes it possible to understand that *L*'s use of the sentence with *ter que* is based on an informal rule of behavior according to which one should not spoil surprises.

At the age of 4;06.13, *L* already uses modal *poder* with epistemic interpretation. In the following example, *poder* is used with both epistemic and root interpretations:

(21) Situation: *L* and her mother are talking with *L*'s brother, who wants to play football

L: Tá tudo molhado. Não **pode** joga(r) futebol hoje.

'It's all wet. You can't play football today'

M: É.

'Yes'

M: Lá na rua não dá mesmo, não.

'In the street it is not even possible'

L: É.

'Yes'

M: Tá tudo molhado.

'It's all wet'

L: É. Pode, **pode** escorrega(r), **pode** se machuca(r).

'Yes. You can, can slip, can hurt yourself'

In this example, *L* uses *poder* initially as a root modal associated either with circumstantial interpretation (because of the fact that the street is wet, her brother cannot play) or with a deontic interpretation (expressing a permission). The last two uses of *poder* are clearly epistemic, since *L* is using the evidence available to her (i.e., the fact that the street is all) to say to that, if her brother plays football in the street, he can slip and hurt himself.

The following Table summarizes the use of modal verbs in *L*'s speech:

***L*'s corpus**

Age	Modals: occurrences and meanings
1;04.08 – 1;11.09	-
2;01.25 – 2;04.23	$Poder_{ROOT}$: 2
3;00.09 – 3;07.28	$Poder_{ROOT}$: 23 $Poder_{EPISTEMIC}$: 1 $Ter\ que_{ROOT}$: 16 $Dever_{EPISTEMIC}$: 1
4;09.21 – 4;10.06	$Poder_{ROOT}$: 326 $Poder_{EPISTEMIC}$: 7 $Ter\ que_{ROOT}$: 270 $Dever_{EPISTEMIC}$: 6

Table 3: Modals in *L*'s speech – number of occurrences and meanings

According to numerical data present on Table 3, of the three modals, *poder* is the most used (359 data) followed by *ter que* (286 data) and, finally, by *dever* (7 data). Concerning the interpretations of these verbs, we can point out the following facts: a) *poder* appears with both root and epistemic interpretations, with a great preference for the root one; b) *dever* is associated only with the epistemic interpretation and, as a consequence, c) there is no example in the corpus of root *dever*.

In the next section, the facts presented so far concerning the acquisition of modal verbs in BrP will be compared and analyzed.

4.3 THE ACQUISITION OF ROOT AND EPISTEMIC MODALS: COMPARING THE DATA

Let us start the comparison of *R* and *L*'s data by looking to lexical acquisition. How are modals acquired by these two children?

The striking fact to be noted is the systematic way in which modals are acquired: modal verb *poder* emerges first, then *ter que* arises and lastly *dever* appears. Lexical acquisition of BrP modal verbs follows an order dictated by the quantificational modal force of the modal: *R* and *L* acquire first the existential/possibility modal *poder* and then they acquire the universal/necessity modals. In acquiring necessity modals, another sequence can be identified: first they acquire the strong necessity modal *ter que*, and then they acquire the weak necessity modal *dever*.
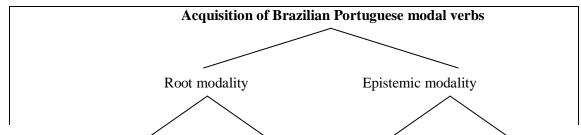
Regarding the development of the interpretations of these modals, it is also possible to identify an acquisitional path: root modality is acquired earlier than epistemic modality. This fact means that, when acquire BrP modal verbs, *L* and *R* associate them initially with a circumstantial modal base (this is the case of *poder* and *ter que*) and later they also associate

them with an epistemic modal base (this is the case of *dever*, for both children, and *poder* in *L*'s productions). These facts are important because they show that there is a similarity in the acquisition of modality in BrP and in other languages, as it was shown in Section 3.

One important issue that seems unclear from data is why there is a systematic absence in both samples of modal verb *dever* associated with a root interpretation. The lack of this verb in a root interpretation can be related to the fact that another necessity modal is already been used for conveying this flavor of modality: the strong necessity modal *ter que*. To put in another way, given that *ter que* is already present in children's grammar and interpreted as a root modal, there is no need for another modal verb to convey this very same interpretation. If this observation proves correct, then it is possible to conclude that, once that *R* and *L*'s grammars select the necessity modal *ter que* to express root modality, it is left for *dever* the task of conveying epistemic modality. In other words, the necessity modal *dever* in the child grammars here analyzed is restricted to express a single type of modality, namely, the epistemic modality.[22] Instead of competing with *ter que* for the expression of root modality, the emergence of *dever* in BrP child grammar will fill in the gap of epistemic modality in the system of modal verbs.

If this analysis is on the right track, we can argue that the appearance of necessity modals in BrP child grammar brings two important pieces of information about the acquisition of modal verbs. First, the appearance of *ter que* marks the moment in which the system of root modals of this grammar is complete and consists of one possibility modal (*poder*) and one necessity modal (*ter que*). Second, the appearance of *dever* signals the moment of emergence of the system of epistemic modals in this grammar.

The following Figure sums up the data relative the acquisition of modal verbs by *R* and *L*, showing the order of appearance of modals in their productions and the interpretations each one of these verbs can receive:

Acquisition of Brazilian Portuguese modal verbs

Root modality   Epistemic modality

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[22] It is beyond the scope of this paper to investigate whether this is also a characteristic of adult BrP grammar. I will leave this question open for further investigation.

Children	poder	ter que	dever	poder
R	1;11.12	2;05.15	2;07.12	----
L	2;02.23	3;01.07	3;01.07	3;06.13

Figure 2: Acquisition of Brazilian Portuguese modal verbs – order and interpretations

Looking at Figure 2, a final question relates to the ages of onset of modals in each child. *Poder* appears early in *R*'s speech but later in the *L*'s speech. This contrast may have to do with differences in the quantity of sessions analyzed between the age of 1 and 3 years: 51 sessions for *R* and 19 sessions for *L*. The fact that there are only two sessions to the age of 4 years in *R*'s corpus may also explain the lack of *poder* with epistemic interpretation in her productions (see Table 1).

CONCLUDING REMARKS AND DIRECTIONS FOR FURTHER RESEARCH

This paper was a first attempt at accounting for the acquisition of BrP modal verb system adopting a formal framework, namely Kratzer's theory of modality. The study was based on naturalistic data of two female children acquiring BrP as their first language and, from the analysis of these production data, it was possible to map the acquisition of modal verbs and modality in BrP and consequently provide answers to the three questions posed at the beginning of the paper.

With respect to the acquisition of modal verbs in BrP, the important fact which was revealed by the data, is that these verbs are not acquired at the same time. There is an order for their acquisition which takes into consideration the quantificational force of these verbs. Thus, possibility modal *poder* is the first verb which appears in *R* and *L*'s productions followed by strong necessity modal *ter que* and, finally, by the weak necessity modal *dever*.

As for the acquisition of modality, the analysis has shown that root modality emerges before epistemic modality. In other words, the different modal meanings do not appear at the same time but there exists also an order for their appearance. Considering the interpretations BrP modals can receive, the facts are as follows. Modal *poder* is associated with root

modality in both grammars (and later, with epistemic modality in *L*'s grammar only). The necessity modals show an internal organization such that *ter que* is associated only with the expression of root modality (as expected, since it cannot combine with an epistemic modal base) whereas *dever*, which in adult grammar can combine with both circumstantial and epistemic modal bases, in *R* and *L*'s grammars is restricted to the expression of epistemic modality.

The facts concerning the acquisition of modality in BrP lead necessarily to the question regarding the acquisition of modality in a cross-linguistic perspective and show a similarity between the acquisition of modality in BrP and in other languages. In other words, there seems to be an acquisitional path for modality which involves the appearance of root modality in a first moment and the appearance of epistemic modality in a second moment.

To conclude, the main findings reported in this paper bring along two questions worth mentioning. The first has to do with the similarity of the acquisition of modal verbs and modality in *L* and *R*'s grammar. Would this be a direct consequence of the fact that the data analyzed here came from production of only two children and these children were both girls? Would the results be the same if a larger set of data from more children (in equal proportion of boys and girls) was studied? This is a question to be taken into account in future research.

The other question relates to the nature of the analyzed data. In this paper, only naturalistic data were analyzed and the conclusions drawn were solely based on them. Would the conclusions be the same if we analyzed also experimental data? This is an important issue given that "the link between production and comprehension is not a straightforward as it might seem" (Papafragou 1998: 377). These are questions I would like to answer in future work.

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RESUMO: Este artigo trata da aquisição dos verbos modais a partir de dados de produção de duas crianças adquirindo o Português Brasileiro e utiliza como quadro teórico de referência a teoria da modalidade proposta por Kratzer (1977, 1981, 1991, 2012). No que se refere à aquisição lexical, os verbos modais são adquiridos de maneira sistemática pelas duas crianças e seguindo uma ordem que leva em conta o conceito de força quantificacional: em primeiro lugar, é adquirido o modal de possibilidade *poder* e, em seguida, são adquiridos os modais de necessidade (inicialmente o modal de necessidade forte *ter que* e depois o modal de necessidade fraca *dever*). Em relação às interpretações dos modais, também se verifica uma regularidade: as crianças adquiriram primeiramente a modalidade de raiz (associando-a aos verbos *poder* e *dever*) e, mais tarde, elas adquiriram a modalidade epistêmica (associando-a ao verbo *dever*). Esse resultado se aproxima do que já foi relatado para

outras línguas, sugerindo haver um caminho na aquisição da modalidade: a modalidade de raiz emerge antes da modalidade epistêmica. Além disso, a análise dos dados permite afirmar que, nas gramáticas infantis aqui estudadas, o sistema de modais de necessidade é composto de verbos especializados em relação à base modal com que se combinam: *ter que* é um modal de necessidade forte que se combina com uma base modal circunstancial e *dever* é um modal de necessidade fraca que se combina com uma base modal epistêmica.

PALAVRAS-CHAVE: Verbos modais; aquisição da linguagem; semântica de mundos possíveis; português brasileiro.