

## Translation and adaptation of Theory of Mind tasks into Brazilian Portuguese

### Tradução e adaptação de tarefas de Teoria da Mente para o português brasileiro

Breno Sanvicente-Vieira,<sup>1</sup> Elisa Brietzke,<sup>2</sup> Rodrigo Grassi-Oliveira<sup>3</sup>

#### Abstract

**Background:** Theory of mind (ToM) is a field of social cognition that deals with the individual's cognitive ability to interpret or infer the mental states of others based on previous knowledge. Recently, research has shown that this ability is compromised in patients with some psychopathologies, e.g., schizophrenia and autistic disorder. Investigators have also shown that deficits in ToM have impacts on social functioning and, consequently, on quality of life. Even though ToM studies have recently grown in number, some problems still remain (e.g., the difficulty of standardized tools to assess ToM in different languages).

**Objectives:** To describe the translation and adaptation into Brazilian Portuguese of two of the most important and widely used ToM tasks, namely, the Theory of Mind Stories and the Hinting Task.

**Method:** The process included the following steps: 1) translation; 2) production of a single translated version and review by specialists; 3) back-translation into English; 4) review by an English-speaking specialist; 5) adaptation of marked corrections; and 6) pilot application in a group representative of the target population (people with schizophrenia).

**Results:** A final translated version was obtained for each of the tasks. Both instruments were well understood by participants and can now be used in the Brazilian experimental setting.

**Conclusion:** The availability of two major ToM tasks in Brazilian Portuguese facilitates the conduction of research on the topic in Brazil. In the future, this could help design clinical interventions aimed at people with social and cognitive difficulties.

**Keywords:** Theory of mind, schizophrenia, social cognition, instrument, assessment.

#### Resumo

**Introdução:** A teoria da mente (*theory of mind*, ToM) é um domínio da cognição social que se refere à habilidade cognitiva de interpretar ou inferir estados mentais de outras pessoas através de conhecimentos prévios. Recentemente, pesquisas têm mostrado que essa capacidade está comprometida em algumas psicopatologias, como esquizofrenia e autismo. Além disso, pesquisadores têm mostrado que déficits na ToM impactam a funcionalidade social e, conseqüentemente, a qualidade de vida. Apesar do aumento recente de estudos na área, ainda há limitações (por exemplo a dificuldade de instrumentos estandardizados para avaliar essa habilidade em diferentes idiomas).

**Objetivos:** Descrever a tradução e a adaptação para o português brasileiro de duas das mais importantes e amplamente utilizadas tarefas de ToM - o Theory of Mind Stories e o Hinting Task.

**Método:** O processo incluiu as seguintes etapas: 1) tradução; 2) produção de uma versão unificada e avaliada por especialistas; 3) retrotradução para o inglês; 4) revisão da versão em inglês por especialista; 5) adaptação das correções indicadas; e 6) aplicação de estudo piloto em um grupo representativo da população para qual as tarefas foram originalmente desenvolvidas (portadores de esquizofrenia).

**Resultados:** Uma versão final em português foi obtida para cada uma das tarefas. Ambos os instrumentos demonstraram boa compreensão por parte dos participantes e podem agora ser utilizados no contexto experimental brasileiro.

**Conclusões:** A disponibilização de duas das mais consagradas tarefas de ToM em português brasileiro favorece o desenvolvimento de pesquisas sobre o assunto no Brasil. No futuro, isso pode auxiliar no planejamento de intervenções clínicas direcionadas a indivíduos com dificuldades sociocognitivas.

**Descritores:** Teoria da mente, esquizofrenia, cognição social, instrumento, avaliação.

<sup>1</sup> Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Porto Alegre, RS, Brazil. <sup>2</sup> MD, MS, PhD. Programa de Reconhecimento e Intervenção em Indivíduos em Estados Mentais de Risco (PRISMA), Departamento de Psiquiatria, Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil. <sup>3</sup> MD, MS, PhD. PUCRS. Submitted Nov 24 2011, accepted for publication Jan 07 2012. No conflicts of interest declared concerning the publication of this article.

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## Introduction

Theory of mind (ToM), also referred to as mindreading, describes the individual's cognitive ability to infer or interpret others' mental states, thoughts, beliefs, intentions, feelings, or desires.<sup>1-4</sup> Because ToM affects social cognition, it also has an impact on social functioning; as a result, ToM impairment is commonly associated with psychopathologies, especially schizophrenia.<sup>5-7</sup> In fact, in schizophrenic patients, ToM is considered to be the variable most strongly related to the functional outcome of the disorder.<sup>8</sup> Even though this is a relevant field of investigation, some important limitations hinder the improvement of knowledge on ToM, e.g. the scarcity of instruments that correctly assess this ability. Such limitation is particularly evident in the Brazilian research setting, where instruments translated and adapted to the local reality are currently lacking.<sup>9</sup>

There are different paradigms for the assessment of social cognition.<sup>10,11</sup> Recognition of emotional face expressions<sup>12,13</sup> and false beliefs<sup>3,14,15</sup> are widely used, and the Hinting Task<sup>16</sup> is one of the most frequently used tasks,<sup>5,17,18</sup> especially in populations with psychotic disorders. Another task frequently used in international studies is the ToM Stories or Deception Task,<sup>3,19,20</sup> also based on the false belief paradigm. These two tasks were used by Frith et al.,<sup>1</sup> who for the first time suggested an association between poor performance in ToM tasks and psychotic symptoms (hallucinations and delusions). That study is extremely relevant in the field of social cognition, since it was the first to raise the hypothesis that ToM could influence the functioning of patients with disorders such as schizophrenia or schizoaffective disorder.<sup>4</sup>

The paradigm of false beliefs, present in both tasks, considers the existence of two levels of beliefs: the first level refers to inferences about the behavior or reaction of a subject that does not know something (first-order belief); the second level requires some deeper degree of abstraction, because participant has to infer what a third person will think, or how they will react, once they become aware of the lack of knowledge of the first subject (second-order belief).<sup>2,3,21</sup> In this type of task, questions are usually scored as 0 when incorrect or 1 when correct.<sup>3,16,21-24</sup> One of the limitations related to the use of ToM tasks is the fact that they can only be used for comparative purposes, e.g., in a study designed to assess differences between groups, or to compare two measures in the same group but at different times (e.g., before and after an intervention).<sup>11</sup> Criticism is based on the impossibility to standardize normative values and consequently to classify each score. As a result, application of a ToM task to one particular individual will not allow to conclude whether he/she has or not ToM

deficit. This concept is different from that underlying intelligence quotient measures, for example, where score standardization allows to classify subjects as superior, above average, average, below average, etc.<sup>25</sup>

The ToM Stories is a classic false belief task. It includes first- and second-order reasoning questions and comprises six sketches or stories. The instrument was developed by Frith & Corcoran<sup>3</sup> and subsequently revised by Moore et al.<sup>15</sup> Each sketch is accompanied by cartoons to ensure that the subject will receive both verbal and visual stimuli<sup>5</sup>; each story is aimed at assessing specific aspects involved in ToM processes (Figure 1). The objective is to use ToM reasoning to infer the results of interactions between story characters, identifying the outcomes and reactions that characters will present in relation to the knowledge they had of the situation.<sup>3-5</sup> ToM tasks are usually applied independently or unassociated with other measures, e.g., memory or attention measures. Because the task includes questions based on mnemonics, inferences and reality assessment, therefore the instrument is able to self-control variables influencing ToM.<sup>3</sup>



**Figure 1** – Cartoons illustrating one of the stories of the Theory of Mind Stories

The Hinting Task<sup>15</sup> is another false belief task comprised of 10 short sketches or stories. In the stories, statements are made about interactions between some of the characters; at the end of each story, the subject is asked to infer the characters' intentions. Most of

the stories include irony, metaphors, or merely words ordered in a not very direct/clear way.<sup>6,7</sup> After each story, two questions are made regarding the intentions of characters. Application is very fast, which is an important advantage of this instrument.<sup>4,15</sup> The Hinting Task is usually referred to as the most sensitive one to detect differences in the performance of schizophrenic patients vs. that of controls.<sup>26</sup>

Therefore, the objective of this study is to describe the translation and adaptation into Brazilian Portuguese of two important and widely used ToM tasks, namely, the ToM Stories and the Hinting Task.

## Method

Before starting the translation and adaptation of the two instruments (ToM Stories and the Hinting Task) into Brazilian Portuguese, the authors requested and obtained authorization from the author of the original scales, Dr. Rhiannon Corcoran. The translation process followed the guidelines recommended for the adaptation of health-related instruments,<sup>27</sup> namely: 1) initial translation into Brazilian Portuguese by two independent translators who had Portuguese as their mother tongue, one of which was a specialist in neuropsychology; 2)

unification of the two initial versions (T1 and T2) by a specialist committee to generate one single version in Brazilian Portuguese (T3); 3) back-translation of the unified version into English by an experienced bilingual translator who had English as his mother tongue (BT); 4) correction of the resulting English version by an English-speaking specialist (C1), namely the author of the original scales (Dr. Corcoran) ; 5) incorporation and adaptation of suggested corrections, correcting the Portuguese version where appropriate and establishing a final version in Portuguese (F); 6) finally, pilot application of the instrument in a clinical population in order to identify possible comprehension problems and implement further corrections, if needed (P). The whole process is illustrated and described in Figure 2.

### Pilot study participants

The sixth stage of this study included the pilot application of both instruments in a group of four subjects diagnosed with schizophrenia according to the criteria of the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV).<sup>28</sup> Participants were randomly selected at a public schizophrenia outpatient service. Two of the individuals were male and two female, and all were literate and had more than 7 years of formal

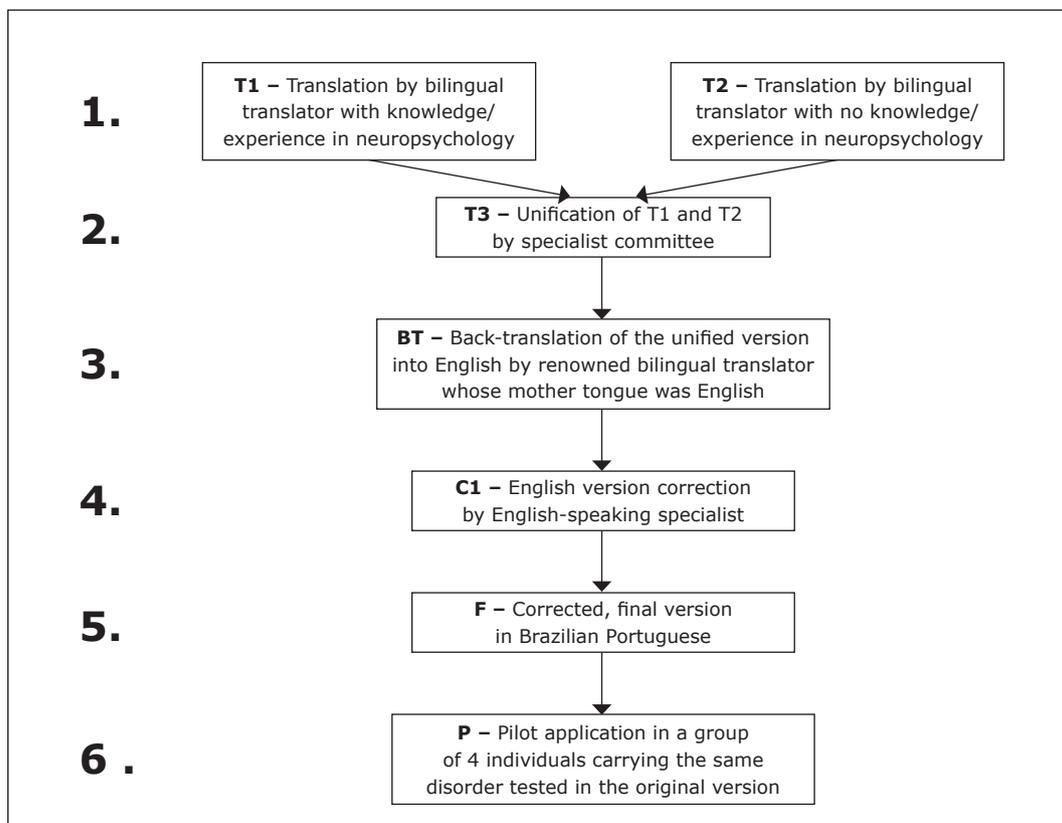


Figure 2 – Methodological steps of the translation process

education. All subjects agreed to participate in the study and signed an informed consent form prior to instrument application. The project had been previously approved by the Research Ethics Committee of the institution where the study was carried out.

## Results

All proposed methodological steps were successfully accomplished and yielded one single final version of each instrument in Brazilian Portuguese. Throughout the process, most corrections dealt with the verb tenses used in the sketches/stories, which varied frequently. Verb tense corrections were implemented cautiously, so as to avoid an incoherent final text. Another issue that could only be addressed after translation completion was the use of idiomatic expressions, for example in the story presented in Table 1. In English, the expression “right up my street” means having expertise in a given subject, but apparently neither of the initial translators was aware of this meaning. The mistake was corrected at stage 4, namely, during review by an English-speaking specialist, and subsequently in the translated version.

Cultural differences also posed difficulties during the adaptation process, however they were all resolved via close contact and collaboration among specialists and translators. One example is taken from a sketch/story of the ToM Stories: two friends agree that they will “buy rounds of drinks,” a common habit in several countries but not in Brazil. In order to solve this problem, a small text was added to the adapted version, as follows:

“Robson diz que pagará as primeiras bebidas, se Denise pagar as seguintes” (“Robson says he will buy the first round if Denise agrees to buy the next one”).

Another cultural aspect that was agreed upon by the two specialist committees was related to the need to localize the names of the characters. As a result, the names contained in the original version were replaced with common Brazilian names, so as to facilitate understanding by future interviewees. Nevertheless, we tried to look for names that kept something in common with the English names, i.e., that would have either common letters or phonemes, to retain a connection with the original scale. Examples of the translation process of the Hinting Task and ToM Stories are shown in Tables 1 and 2, respectively.

No comprehension difficulties were faced during pilot application of the instruments. There were no doubts regarding the terms or grammatical constructions employed. Notwithstanding, the absence of comprehension difficulties did not exclude the possibility of respondents giving wrong answers eventually, therefore suggesting that although the instruments were well understood, their evaluative capacity was maintained. The answers provided by each of the participants are shown in Tables 3 (Hinting Task) and 4 (ToM Stories). The last column indicates the number of correct answers provided. The answers described are related to the same stories presented in Tables 1 and 2.

The full versions of both instruments in Brazilian Portuguese can be obtained directly with the corresponding author via email (see correspondence information below).

**Table 1** – The Hinting Task translation process: examples

Original	Unified translation	Back-translation	
Donald wants to run a project at work but Richard, his boss, has asked someone else to run it. Donald says:	Daniel quer ser responsável por um projeto no trabalho, mas Ricardo, seu chefe, pede para outra pessoa para fazer a tarefa. Daniel diz para seu chefe:	Daniel wants to be responsible for a project at work, but Ricardo, his boss, asks someone else to do it. Daniel says to his boss:	Daniel quer ser responsável por um projeto no trabalho, mas Ricardo, seu chefe, pede para outra pessoa para fazer a tarefa. Daniel diz para seu chefe:
“What a pity. I’m not too busy at the moment.”	“Que pena! Eu não estou muito ocupado no momento.”	“What a pity! I’m not very busy at the moment.”	“Que pena! Eu não estou muito ocupado no momento.”
QUESTION: What does Donald really mean when he says this?	QUESTÃO: O que Daniel realmente quer dizer quando fala isso?	QUESTION: What does Daniel really mean when he says this?	QUESTÃO: O que Daniel realmente quer dizer quando fala isso?
ADD: Donald goes on to say:	ADICIONAR: Daniel continua, dizendo:	ADD: Daniel goes on, by saying:	ADICIONAR: Daniel continua, dizendo:
“That project is right up my street.”	“Esse projeto acontecerá bem perto da minha casa.”	“This project will take place near my house.”	“Esse projeto é bem da área que eu domino.”
QUESTION: What does Donald want Richard to do?	QUESTÃO: O que Daniel quer que Ricardo faça?	QUESTION: What does Daniel want Ricardo to do?	QUESTÃO: O que Daniel quer que Ricardo faça?

**Table 2** – The Theory of Mind Stories translation process: examples

Original	Unified translation	Back-translation	Final version
It's Mary's birthday and her auntie pops in to give her a box of chocolates. She puts her chocolates in her top drawer.	É o aniversário de Mariana e a sua tia apareceu para dar-lhe uma caixa de chocolates. Mariana guardou os chocolates na gaveta de cima de seu armário, para mantê-los seguros.	It is Mariana's birthday, and her aunt showed up to give her a box of chocolates. Mariana put the chocolates in the top drawer of her closet, for safekeeping.	É o aniversário de Mariana e a sua tia apareceu para dar-lhe uma caixa de chocolates. Mariana guardou os chocolates na gaveta de cima de seu armário, para mantê-los seguros.
MEMORY QUESTION: Where does Mary put her chocolates?	QUESTÃO MNEMÔNICA: Onde Mariana guardou os chocolates?	MEMORY QUESTION: Where did Mariana put the chocolates?	QUESTÃO MNEMÔNICA: Onde Mariana guardou os chocolates?
A few minutes later her greedy brother Bill comes in and asks Mary:	Alguns minutos depois seu ganancioso irmão, Beto, aparece perguntando para Mariana:	A few minutes later, her sweet tooth brother, Beto, asks Mariana:	Alguns minutos depois seu ganancioso irmão, Beto, aparece perguntando para Mariana:
"Where have you put your chocolates, in your top drawer or your bottom drawer?"	"Onde você colocou seus chocolates? Na gaveta de cima ou na gaveta de baixo?"	"Where did you put the chocolates? In the top or bottom drawer?"	Onde você colocou seus chocolates? Na gaveta de cima ou na gaveta de baixo?
Mary doesn't want Bill to find her chocolates	Mariana não quer que Beto encontre os chocolates.	Mariana doesn't want Beto to find the chocolates.	Mariana não quer que Beto encontre os chocolates.
FOD QUESTION: In which drawer does Mary say her chocolates are and why?	QUESTÃO DE PRIMEIRA ORDEM: Em qual gaveta Mariana dirá que os seus chocolates estão guardados? Por quê?	FOD QUESTION: In which drawer will Mariana say the chocolates are in? Why?	QUESTÃO DE PRIMEIRA ORDEM: Em qual gaveta Mariana dirá que os seus chocolates estão guardados? Por quê?
REALITY QUESTION: Where are the chocolates really?	QUESTÃO DE REALIDADE: Onde os chocolates realmente estão?	REALITY QUESTION: Where are the chocolates really hidden?	QUESTÃO DE REALIDADE: Onde os chocolates realmente estão?
INFERENCE QUESTION: Does Mary's auntie live close to her?	QUESTÃO DE INFERÊNCIA: A tia de Mariana mora perto da casa de Mariana?	INFERENCE QUESTION: Does Mariana's aunt lives near her?	QUESTÃO DE INFERÊNCIA: A tia de Mariana mora perto da casa de Mariana?
Mary discovers that 5 of her chocolates have disappeared. She suspects that Bill was not fooled when she said her chocolates were in the bottom drawer and has pinched them.	Mais tarde Mariana descobriu que 5 dos seus chocolates haviam sumido. Ela suspeita que Beto os pegou e não foi enganado quando disse que os chocolates estavam na gaveta de baixo.	Later on, Mariana found out that 5 of her chocolates were missing. She suspects Beto took them, and that he wasn't fooled when she told him that the chocolates were in the bottom drawer.	Mais tarde Mariana descobriu que 5 dos seus chocolates haviam sumido. Ela suspeita que Beto os pegou e, portanto, não foi enganado quando lhe disse que os chocolates estavam na gaveta de baixo.
Later on Mary's best friend gives her a tin of sweets. She hides these carefully in her bottom drawer. Mary doesn't want Bill to pinch any of these.	Mais tarde a melhor amiga de Mariana lhe dá um saco de balas. Ela esconde cuidadosamente na sua gaveta de baixo. Mariana não quer que Beto roube nenhuma bala.	After that, Mariana's best friend gives her a bag of candy. She carefully hides them in the bottom drawer. Mariana doesn't want Beto to steal any candy.	Mais tarde a melhor amiga de Mariana lhe dá um saco de balas. Ela o esconde cuidadosamente na sua gaveta de baixo. Mariana não quer que Beto roube nenhuma bala.
MEMORY QUESTION: Where does Mary put the tin of sweets?	QUESTÃO MNEMÔNICA: Onde Mariana guardou o saco de balas?	MEMORY QUESTION: Where did Mariana put the bag of candy?	QUESTÃO MNEMÔNICA: Onde Mariana guardou o saco de balas?
When Bill next sees Mary he asks:	Quando Beto viu Mariana ele perguntou:	When Beto saw Mariana, he asked:	Quando Beto viu Mariana ele perguntou:
"Where have you put your sweets, in your top drawer or your bottom drawer?"	"Onde você guardou as balas, na gaveta de cima ou na gaveta de baixo?"	"Where did you put the candy? In the top or bottom drawer?"	"Onde você guardou as balas, na gaveta de cima ou na gaveta de baixo?"
Bill expects Mary to lie, but Mary is very clever and realizes this and she doesn't want Bill to find her sweets.	Beto espera que Mariana minta de novo, mas ela é muito esperta e se dá conta disso. Novamente ela não quer que Beto encontre as balas.	Beto expects Mariana to lie again, but she is too smart and notices this. Again, she doesn't want Beto to find the candy.	Beto espera que Mariana minta de novo, mas ela é muito esperta e sabe disso. Novamente ela não quer que Beto encontre as balas.
SOD QUESTION: In which drawer will Mary say her sweets are and why?	QUESTÃO DE SEGUNDA ORDEM: Em qual gaveta Mariana vai dizer que as balas estão? Por quê?	SOD QUESTION: Which drawer is Mariana going to say the candy is in? Why?	QUESTÃO DE SEGUNDA ORDEM: Em qual gaveta Mariana vai dizer que as balas estão? Por quê?
REALITY QUESTION: Where are the sweets really?	QUESTÃO DE REALIDADE: Onde os doces realmente estão?	REALITY QUESTION: Where is the candy?	QUESTÃO DE REALIDADE: Onde os doces realmente estão?
INFERENCE QUESTION: Does Bill have a sweet tooth?	QUESTÃO DE INFERÊNCIA: Beto é guloso?	INFERENCE QUESTION: Is Beto a sweet tooth?	QUESTÃO DE INFERÊNCIA: Beto é guloso?

FOD = first-order; SOD = second-order.

**Table 3 – Answers provided to the Hinting Task**

	<b>Answer 1</b>	<b>Answer 2</b>	<b>No. correct answers</b>
Participant 1	That he could be in charge of the project.	He more or less asks Ricardo again to give him the project.	2
Participant 2	That he is available.	He wants Ricardo to give an opportunity to him rather than to the other person.	1
Participant 3	That he needs to work.	He wants Ricardo to find a similar project for him.	0
Participant 4	That he wants the boss to tell him to do the job.	He wants Ricardo to give him the project.	2

**Table 4 – Answers provided to the Theory of Mind Stories**

	<b>Mnemonic question 1</b>	<b>First order question 1</b>	<b>Reality question 1</b>	<b>Inference question 1</b>	<b>Mnemonic question 2</b>	<b>Second order question 2</b>	<b>Reality question 2</b>	<b>Inference question 2</b>	<b>No. correct answers</b>
Participant 1	In her top drawer.	In her bottom drawer. Because she doesn't want him to find the chocolates.	In her top drawer.	I don't think so.	In her bottom drawer.	In the bottom drawer, because she knows her brother will not believe her. She will try to fool him.	In the bottom drawer.	Yes, he's eaten the chocolate and now he wants the candy.	7
Participant 2	In her top drawer.	In her bottom drawer, so that he doesn't find them.	In her top drawer.	I'm not sure, but since she was the only one dropping by and didn't even stay, I believe she lives near.	In her bottom drawer.	In the bottom drawer, because he did not believe her the first time.	In the bottom drawer.	Yes, indeed.	8
Participant 3	In her top drawer.	In her top drawer, so that he can't reach.	In her top drawer.	No, she lives far away and may even have traveled to get there.	In her bottom drawer, this time.	She doesn't want him to mess with her stuff, so she won't tell the truth, she'll say it's in the other drawer (the top drawer).	In the bottom drawer.	Maybe... I believe so.	5
Participant 4	In her top drawer.	At the bottom, because she wants to fool him.	In her top drawer.	Yes, she does.	In her bottom drawer.	In the bottom drawer, she will fool him.	In the bottom drawer	Yes.	8

## Discussion

Experimental research into social cognition is constantly being stimulated, as there is evidence suggesting that the way in which patients with psychopathologies interpret social stimuli affect their behaviors and quality of life.<sup>29</sup> ToM is the field of social cognition where impairment is most closely associated with poor social functioning, a typical finding in psychopathologies, especially schizophrenia,<sup>30</sup> although other disorders have also been assessed.<sup>31-33</sup> Considering the relevance of the topic, the present study allows new perspectives to be developed in the field of social cognition, as now Brazilian investigators will have at their disposal two consistent social cognition tasks translated and adapted into Brazilian Portuguese.

Because the topic is still very recent, several factors related with ToM remain unknown; as a result, evaluation should be cautious and should take into consideration other variables that may potentially affect results. Although it is

not possible to know for sure which are the variables that may impact or interfere with results, international studies have consistently controlled for the following variables: age, education, and psychiatric, clinical, and neurological comorbidities.<sup>2,5,15</sup> Some studies on chemical dependence have also obtained results suggestive of a poor performance in ToM among dependents when compared with healthy individuals. These studies have controlled for psychotic disorders, time of abstinence, and executive functioning scores.<sup>31,34</sup> In fact, executive functioning, intelligence quotient, and memory have been controlled for in recent studies addressing ToM.<sup>5,15,31</sup> Other variables frequently controlled for, especially in research using false belief tasks, are language and hearing problems.<sup>35</sup> The thorough methodologies adopted in ToM studies reflect the topic's increasing visibility. Moreover, tasks assessing the false belief paradigm, especially the Hinting Task and ToM Stories, have been showing adequate sensitivity to detect impacts on ToM, regardless of the increasingly rigorous

control of variables. Conversely, several uncontrolled variables still remain. One example is history of trauma, which has recently been shown to be associated with ToM performance.<sup>32</sup>

The Hinting Task and the ToM Stories can be useful not only in ToM research but also in the clinical setting, as a tool to help monitor the evolution of a given patient in terms of cognitive improvement/worsening, e.g., by comparing previous and new scores during rehabilitation/retreatment.<sup>36</sup> Notwithstanding, it should be borne in mind that the stories contained in the tasks are short and can therefore be easily learned and memorized by patients; as a result, their repeated use should be avoided or cautiously planned. Also, although the Hinting Task and the ToM Stories are two major tasks,<sup>7,30,37</sup> their use is not aimed at diagnosing ToM impairments; rather, they are comparative tests. The standardization and establishment of cutoffs suggesting deficits could be one further step in ToM research.

Finally, it is also important to consider that, in spite of the major advancement in the field as a result of the availability of two very important and widely used ToM tasks in Brazilian Portuguese,<sup>5,38</sup> these instruments still need to be validated, and their accuracy tested, in the Brazilian setting. These steps should be performed with clinical populations (preferably patients with schizophrenia, which are the target public of these tasks), so that the two instruments can finally and definitively be implemented in the Brazilian scientific and clinical settings. In addition, other ToM assessment paradigms should be investigated, adding to the false belief tasks already available and thus helping advance social cognition research.

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#### Correspondence

Breno Sanvicente-Vieira  
Av. Ipiranga, 6681, prédio 11, sala 936  
90619-900 - Porto Alegre, RS - Brazil  
Tel.: +55-51-3320-3633, ext. 7740  
Fax: +55-51-3320-3633  
E-mail: brenosanvicente@gmail.com