

PONTÍCIA UNIVERSIDADE CATÓLICA DO RIO GRANDE DO SUL
FACULDADE DE PSICOLOGIA
PROGRAMA DE PÓS-GRADUAÇÃO EM PSICOLOGIA
MESTRADO EM PSICOLOGIA

**THEORY OF MIND: ASSESSMENT DEVELOPMENT AND
INVESTIGATION OF COCAINE DEPENDENTS**

BRENO SANVICENTE VIEIRA

Dissertação apresentada ao Programa de Pós-Graduação em Psicologia da Pontifícia Universidade Católica do Rio Grande do Sul como requisito parcial para a obtenção do grau de Mestre em Psicologia.

**Porto Alegre
Janeiro, 2014**

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Dissertação de Mestrado realizada no Programa de Pós-Graduação em Psicologia da Pontifícia Universidade Católica do Rio Grande do Sul, como parte dos requisitos para a obtenção do título de Mestre em Psicologia. Área de Concentração em Cognição Humana.

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RESUMO

INTRODUÇÃO: Transtornos relacionados ao uso de substâncias são caracterizados por problemas sociais. Acredita-se que a origem de tais comprometimentos se deva a déficits em funções da cognição social. Em particular, a Teoria da Mente (ToM) – capacidade de inferir e interpretar os pensamentos de outras pessoas – parece estar prejudicada em dependentes químicos. Portanto, o objetivo deste trabalho foi investigar a ToM em uma amostra de mulheres dependentes de cocaína. **MÉTODO:** Esta dissertação é composta por quatro artigos. O primeiro é uma revisão sistemática sobre a ToM em usuários de drogas. O segundo e terceiro foram dedicados ao desenvolvimento de instrumentos para a avaliação da ToM. O segundo é a tradução e a adaptação ao português brasileiro do *Reading the Mind in the Eyes Test* (RMET), e o terceiro é a validação do *Hinting Task* e do *ToM Stories*. O quarto trabalho representa o principal objetivo da dissertação – investigar a ToM de mulheres dependentes de cocaína. Participaram 30 mulheres com diagnóstico de dependência de cocaína e 30 mulheres saudáveis, sendo os grupos pareados por sexo, idade, anos de estudo, renda e QI. Todas participantes responderam ao RMET, ao *Hinting Task* e ao *ToM Stories*. As participantes também foram avaliadas quanto à sintomatologia psiquiátrica e ao desempenho neuropsicológico. **RESULTADOS:** A revisão sistemática revelou que o uso de álcool e drogas é relacionado a prejuízos na ToM, e que a ToM é associada com aspectos do dia-a-dia e do curso da dependência. No segundo estudo avançou-se no desenvolvimento tecnológico garantindo uma adequada versão traduzida e adaptada do RMET para o português brasileiro. Além disso, no terceiro artigo revelou-se as propriedades psicométricas do *Hinting Task* e do *ToM Stories*. Ambas tarefas demonstraram possuir validades convergente, preditiva, concorrente, discriminativa e diagnóstica. Por fim, o quarto estudo revelou que mulheres dependentes de cocaína obtiveram um desempenho significativamente inferior ao do grupo de mulheres saudáveis nas tarefas de ToM. A performance de ToM foi encontrada negativamente correlacionada com o nível de severidade da dependência de cocaína. **CONCLUSÕES:** Os resultados indicam que mulheres dependentes de cocaína possuem desempenho inferior ao de mulheres saudáveis em tarefas de ToM. Tais achados são consistentes com os da literatura e corroboram com o fato da ToM estar relacionada com manifestações sintomáticas da doença. Com base nos resultados, um modelo ilustrativo da participação bidirecional da ToM no curso da dependência química foi proposto. O modelo sugere que por um lado, prejuízos na habilidade de inferir e interpretar os pensamentos de terceiros vulnerabilizam pessoas ao uso de substância, e, em contrapartida, o uso de substâncias causa eventos tóxicos ao cérebro que acabam alterando circuitos neurobiológicos importantes para a integridade da ToM. As implicações dos resultados e conclusões desta dissertação reforçam o potencial que intervenções que visem a promoção de habilidades psicossociais possuem no tratamento de transtornos aditivos.

Palavras chave: Teoria da mente, cognição social, cocaine, dependência química, psicométrica

Área conforme classificação CNPq: 7.07.00.00-1 - Psicologia

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ABSTRACT

BACKGROUND: Substance use-related disorders are characterized by social problems, thought to be the result of social cognition impairments. In particular, the ability to interpret the thoughts of other people - Theory of Mind (ToM) - seems to be impaired. In view of this, this study aimed to investigate ToM functioning in a cocaine dependent (COD) sample. **METHOD:** This dissertation comprised four studies. The first is a systematic review of ToM in substance users. The second and the third deal with the development of instruments for the ToM assessment. The second is the translation and adaption of the Reading the Mind in the Eyes Test (RMET) into the Brazilian Portuguese, and the third describes the validation of the Hinting task and the ToM Stories task. The fourth work represents the main study of this dissertation – the investigation of the ToM of COD women. 30 COD women and 30 healthy controls (HC) matched for sex, age, education, individual income and IQ took part in this study. All participants were assessed with the RMET, the Hinting Task and the ToM stories. Cognitive and clinical factors were also assessed in order to control for possible differences. **RESULTS:** The systematic review revealed that ToM deficits were present in substance use-related disorders. Besides that, the review indicated that these impairments were related to daily life and clinical features of substance use-related disorders. In addition, this dissertation advanced with regard the technological development, since it guaranteed a translated and adapted Brazilian version of the RMET. By the same token, in the third study the Hinting Task and the ToM Stories were shown to have convergent, predictive, concurrent, discriminative and diagnostic validity. Finally, in the fourth study, COD women were found to have impaired ToM in comparison with HC. Additionally, correlations indicated ToM was negatively associated with dependence chronicity. **CONCLUSION:** Results were consistent with the published literature, suggesting that COD like other drug dependence disorders, is associated with ToM deficits. In view of the results that suggested an association between ToM and social and clinical outcomes, we have proposed a framework in which there is a bidirectional, facilitative relationship between drug use and ToM impairments. The implications of the results for future research and potential interventions based on targeting the psychosocial problems found to be impaired in substance use disorders are discussed.

Keywords: Theory of mind, social cognition, cocaine, substance-related-disorders, psychometrics

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1. PRESENTATION

The main aim of this dissertation was to investigate Theory of Mind (ToM) functioning in cocaine dependent women. It was hypothesized that these women would show ToM impairments, which would in turn suggest directions for future psychosocial interventions addressing the range of social and interpersonal problems found in cocaine dependents (COD) as well as features from this clinical disorder.

Two main strands of evidence provide the background for this hypothesis: firstly, the existence of social and interpersonal impairments in COD (Proctor, Kopak, & Hoffmann, 2012) which have been suggested to be partially accounted for by difficulties in inferring the thoughts of others (Derntl & Habel, 2011). The ability to interpret the thoughts of other people is termed ToM, so it is reasonable to suppose that ToM would be impaired in COD. Secondly, there is evidence that COD causes structural and functional changes in the brain, including changes to the prefrontal cortex and insula (Cisler et al., 2013; Gardini & Venneri, 2012). As the integrity of these brain areas is essential to unimpaired ToM functioning (Adams et al., 2010; Adolphs, 2009), there is also a neurobiological foundation for the hypothesis.

1.1. ToM in mental disorders

ToM (sometimes loosely referred to as mentalizing, folk psychology or mindreading) was first described by Premack and Woodruff in 1978; they investigated whether a chimpanzee could predict the future behavior of a human and found that the animal could use some human signs as cues to infer future particular behaviors. They termed this ability to understand the thoughts of another cognate organism 'Theory of Mind' (Premack & Woodruff, 1978). Later, developmental psychologists started to test ToM in children and discovered that children with disorders of the neural development (i.e. autism and Asperger's syndrome) have ToM impairments (Happé, 1994). The initial findings were replicated (Baron-Cohen, O'Riordan, Stone, Jones, & Plaisted, 1999) and the evidence for ToM deficits in autism became the basis of a framework explaining, for example, why autistic people present with isolationism and interpersonal difficulties, (Baron-Cohen, 1995). Since psychotic patients distort environmental information and suffer delusions, ToM started to be investigated in schizophrenia patients. As had happened in autism

research, evidence for altered ToM in psychosis was found (Corcoran & Frith, 2003; Frith & Corcoran, 1996; Mazza, De Risio, Surian, Roncone, & Casacchia, 2001), and a framework describing the role of ToM impairments in positive psychotic symptoms was developed by Frith et al. (1996). Recently there has been research on ToM in other psychiatric conditions, and evidence of impairments has been found in mood disorders (Wolf, Brüne, & Assion, 2010), Parkinson's disease (Santangelo et al., 2012) and post-traumatic stress disorder (Nazarov et al., 2013).

Theoretical reviews have discussed how ToM changes can explain some of the changes in social and interpersonal behavior found in drug use disorders, as well as some symptomatic features (Homer et al., 2008; Kemmis, Hall, Kingston, & Morgan, 2007; Uekermann, Channon, Winkel, Schlebusch, & Daum, 2007), providing support for our hypothesis of ToM impairments in COD. Most ToM research in drug users has studied the effects of alcohol and methamphetamines (Henry, Mazur, & Rendell, 2009; Homer, Halkitis, Moeller, & Solomon, 2012; Kim, Kwon, & Chang, 2011; Kornreich et al., 2011; Uekermann et al., 2007), whilst there have been little research on ToM in users of cocaine, marijuana and others drugs.

1.2. Present Dissertation

The outline of the project was developed on the basis of (I) the role that ToM is suggested to play in psychiatric disorders, including substance use-related disorders (SUD) such as cocaine and (II), the lack of studies addressing ToM in cocaine users. The structure of this dissertation is as follows: in Chapter 1 the rationale for the project is described in more detail, including an overview of ToM in mental disorders. The next three chapters consist of papers that I wrote during my Master's course – being these chapters the scientific production of my dissertation. Chapter 2 is a review of research on ToM in substance use conditions. This chapter reproduces the first paper in my Master's dissertation: *Theory of Mind in substance users: a systematic review*. Chapter 3 describes the development of the instruments used in this research and consists of two other papers: the translation and adaptation of the “Reading the Mind in the Eyes Test” (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) to the Brazilian Portuguese, *Revised Reading the Mind in the Eyes Test (RMET), Brazilian version*; and the validation of the Brazilian version of the Hinting task and the ToM Stories task (Sanvicente-Vieira, Brietzke, & Grassi-Oliveira, 2012),

Reliability and Validity of a Brazilian Battery for Theory of Mind Assessment.

Chapter 4 reports an empirical investigation of ToM in cocaine dependent women, the main study in this project, *Theory of Mind Impairments in Cocaine Dependent Women*. Finally, in Chapter 5 the findings are discussed; conclusions are drawn and these findings together with previously published literature are used to provide suggestions for future research.

All my work was carried out in collaboration with other institutions and centers: healthy controls were recruited from the ambulatory of research from the NEPTE of the PUCRS; cocaine dependents were recruited from the São Rafael Unity from the HMD and participants diagnosed with schizophrenia were recruited from the PROESQ from the UNIFESP. All the ethical requirements were carefully fulfilled and the documents reporting the approval from the Ethical Committee for Research are provided at Appendices I and II.

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5. GENERAL DISCUSSION

5.1. Summary of Results

The main result of the present study is the evidence for ToM impairments in cocaine dependent women in comparison with healthy controls. This finding is presented in Chapter 4 which consists in paper 4: *Theory of Mind Impairments in Cocaine Dependent Women*). These results revealed that, as happens in other substance dependence disorders, cocaine dependence leads to impairments in the ability to infer the thoughts of other people, an impairment which may be responsible for the interpersonal and social impairments that are common in those who suffer from this disease (Proctor, Kopak, & Hoffmann, 2013).

However, the results found in Chapter 4 were only possible due previous work. This includes the systematic review conducted (Chapter 2: *Theory of Mind in substance users: a systematic review*), in order to help us understand the current scientific consensus on ToM impairments in substance use conditions and identify the state-of-the-art instruments used in empirical research. This review revealed a considerable amount of evidence for ToM impairments in substance dependence disorders. However, such results were restricted to alcohol and methamphetamine dependence disorders, since no study had investigated cocaine dependence disorder or cannabis dependence disorder. In view of the growing evidence that drug dependence induces ToM impairments, and the lack of research in cocaine dependent populations, we developed our research objectives, later fulfilled, as described above.

Regarding methodological tools, the review revealed that there were three main paradigms for ToM assessment, each one dealing with a specific route by which individuals can infer the mental states of others. We therefore selected three tasks, one from each of the main assessment paradigms, for use in the empirical work: the Hinting task, the ToM Stories task and the Reading the Mind in the Eyes task. These instruments had not been validated or adapted into Brazilian Portuguese. Therefore, as described in Chapter 3, the Reading the Mind in the Eyes task was translated by following methodological guidelines. This work is reported in the paper *Revised Reading the Mind in the Eyes Test (RMET), Brazilian version*. Differently, there were already Brazilian versions of the Hinting task and the ToM Stories task, developed by

our group (Sanvicente-Vieira, Brietzke, & Grassi-Oliveira, 2012), although these had not been validated. With the objective of enriching the methods available for empirical research, an investigation into the psychometric properties of these Brazilian versions of the original tasks was conducted, resulting in the second paper included in Chapter 3, *Reliability and Validity of a Brazilian Battery for Theory of Mind Assessment*.

5.2. Conclusions

ToM impairments are related to a range of interpersonal problems in psychiatric disorders such as schizophrenia (Sprong, Schothorst, Vos, Hox, & van Engeland, 2007), autism (Di Martino et al., 2009), bipolar disorder (Malhi et al., 2008), eating disorders (Dejong et al., 2013) and others (Chiavarino et al., 2013; Santangelo et al., 2012). By the same token, since substance use disorders are marked by severe social and interpersonal problems it has been suggested that ToM impairments may be involved in these conditions (Homer et al., 2008; Uekermann & Daum, 2008), a theory which has evidences by now (Henry, Mazur, & Rendell, 2009; Maurage et al., 2011; Uekermann, Channon, Winkel, Schlebusch, & Daum, 2007). There is also neuropsychological and physiological evidence to support this hypothesis – brain areas responsible for ToM functioning appear altered in drug dependents while performing ToM tasks (Gizewski et al., 2013; Roser et al., 2012). This evidence for ToM impairments in highlights a possible new approach to interventions for substance use disorders – the manipulation of biopsychosocial factors as part of an integrated approach to promoting recovery from drug addiction and the associated outcomes (e.g. social and interpersonal problems)

This work provided further evidence for ToM impairments in COD; an important contribution because although cocaine has been related to widespread public health and social problems (Duailibi, Ribeiro, & Laranjeira, 2008; Karila, Petit, Lowenstein, & Reynaud, 2012), to our knowledge no previous work had investigated ToM impairments in COD. We also found associations that provide circumstantial support for the implications of the hypotheses discussed, namely that ToM impairments are related to some of the wider measures of substance dependence including dependence chronicity and the repeated need for hospitalizations. ToM impairments might therefore be considered to have an important impact on the course

of COD, and probably of other substance use disorders. New research is needed to provide further evidence for this and to allow the elaboration of a framework describing the role of ToM in the course of substance use disorders. This evidence allows us to recognize ToM as a target for interventions in substance use disorders, as is already starting to happen in autism and schizophrenia (Horan et al., 2011; Lindenmayer et al., 2013).

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