Theory of Mind Deficit in Subjects with Alcohol Use Disorder: An Analysis of Mindreading Processes

Theory of Mind deficit in subjects with alcohol use disorder:

An analysis of mindreading processes

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Abstract

Aim This research aimed to investigate multidimensional Theory of Mind (ToM) abilities in subjects with alcohol use disorder (AS).

Method A semi-structured interview and some brief stories were used to investigate different components of the participants' ToM, namely first vs. third-person, egocentric vs. allocentric, first- vs. second-order ToM. The participants were administered the Theory of Mind Assessment Scale (Bosco et al. 2009a) e and the Strange Stories test (Happé et al. 1999). Twenty-two persons with alcohol use disorder plus an equal number of healthy controls.

Results Persons with alcohol use disorder showed poorer performance compared to controls in all ToM dimension. The patterns of differences between groups varied across the different Th.o.m.a.s. dimensions. In particular AS performed worse on third-person than on first-person ToM, on first-order than on second-order ToM, and from an allocentric than an egocentric perspective.

Conclusions These findings support the hypothesis that AS's ability to understand and attribute mental states is impaired. Future studies should focus on the relevance of the different ToM impairments as predictors of treatment outcome in alcoholism, and on the possibility of proposing different rehabilitative interventions according to ToM assessment.

Introduction

The aim of this study is to investigate the Theory of Mind - or "Mindreading" - originally defined by Premack and Woodruff (Premack and Woodruff 1978) as the ability to ascribe mental states to oneself and to others and to use this knowledge to predict and explain the relevant actions and behaviors (Astington 2003; Nichols and Stich 2003; Paal and Bereczkei 2007; Baron-Cohen 1995), in subjects with alcohol use disorder. Studies on social cognition in alcoholism have shown that the chronic abuse of alcohol (*i.e.* alcoholism) is associated with impairments in the ability to recognize and decode Emotional Facial Expression (EFE) (Foisy et al. 2005, 2007a, 2007b; Kornreich et al. 2001, 2002; Phillipot et al. 1999; Maurage et al. 2008, 2009, 2011a; Monnot et al. 2001; Townshed and Duka 2003; Uekermann et al. 2005) and in emotional prosody and body postures (Maurage et al. 2009; Monnot et al. 2001; Uekermann et al. 2005), and impaired social cognition in general (Uekermann and Daum 2008).

Only a few studies have focused on ToM in subjects with alcohol use disorder (hereafter AS) and found deficits in such ability. Uekermann and colleagues (Uekermann et al. 2007), while investigating humor processing in AS, found that group comparisons revealed cognitive as well as affective humor processing deficits in AS compared to control subjects (hereafter CS). The observed impairments were related in particular to theory of mind (lower scores by AS on three mentalistic questions about the characters of the jokes employed) and executive functions (working memory).

A recent study by Maurage and colleagues (Maurage et al. 2011b) have suggested a possible difference between ‘cognitive empathy’ i.e. the perspective-taking ability which makes it possible to understand and predict the other person’s various mental states (e.g. beliefs, desires, ideas) and ‘emotional empathy’, i.e. the ability to detect and experience other peoples’ emotional states. These results suggest that ‘cognitive empathy’ might be better preserved than ‘emotional empathy’. These

data seem to be in line with the recent findings of Gizewski and colleagues (Gizewski et al. 2012), who suggested that alcohol-related impairment in the ability to infer other people's mental states could be limited to deficits in affective empathy.

From our theoretical perspective (Bosco et al. 2009a, 2009b, Tirassa et al. 2006a, 2006b) 'affective empathy' is a particular aspect of the 'Theory of mind', that is the knowledge referring to another person's emotion.

Finally, always related to the emotional dimensions of ToM, some studies have investigated the relations between alcohol abuse and alexithymia, the ability to recognize, understand and name one's own and other people's emotions. Although it has been proposed that alexithymia is a risk factor in the genesis of alcohol use disorders (De Rick et al. 2006; Thorberg et al. 2009), the patterns of relation between the two, also in respect to severity and time of alcohol abuse, seem to lack any strong empirical evidence (for a critical review see Thorberg et al. 2009).

Considering the relative lack of empirical research on this topic, we decided to assess ToM abilities in a sample of AS. ToM has a complex nature and cannot be reduced to an on–off or an all-or-nothing functioning (Bosco et al. 2009a, 2009b; Castellino et al. 2011; Mazza et al. 2001; Wellman and Liu 2004; Saxe et al. 2006; Gambini et al. 2004; Nichols and Stich 2002; Vogeley et al. 2001). A first and well known distinction in the literature is between first and second-order ToM. First-order ToM reasoning requires an understanding of a character's belief about a state of the world, while success in second-order tasks requires the attribution of nested mental states, that is an understanding of a character's belief about the beliefs of another character, which turns out to be more difficult (Mazza et al. 2001). A second important distinction is that between first and third-person ToM (Bosco et al. 2009a, 2009b; Gambini et al. 2004; Nichols and Stich 2002). First-person ToM refers to the knowledge about one's own mental states, while third-person ToM refers to the ability to understand others' mental states. An fMRI study conducted by Vogeley and colleagues

(Vogeley et al. 2001) found common and different patterns of brain activation as healthy subjects took the first or the third-person perspective. The debate is ongoing because some researchers argue that humans in general are better at reasoning in the first person (Bosco et al. 2009a; Goldman 1993), while others claim the contrary (Gambini et al. 2004; Gopnick 1993) (for a discussion see Bosco et al. 2009a). However, classically empirical tasks built to investigate ToM ability focus on third-person ToM (Baron-Cohen 1995; Happé et al. 1999; Premack and Woodruff 1978; Wimmer et al. 1983). Another distinction, orthogonal to that between first and third-person ToM, is that between egocentrism and allocentrism (Frith and De Vignemont 2005). In the egocentric perspective, others are represented in relation to the self, while in the allocentric perspective others' mental states are represented independently from the self.

In the light of these considerations, the aim of the present study was to conduct a broad assessment of ToM abilities in subjects with alcohol use disorder. To fulfill this goal we used (as described in detail in the next section) the Th.o.m.a.s (Bosco et al. 2009a; Catellino et al. 2011), a semi-structured interview for investigating various aspects of ToM, plus a classical ToM test (Strange Stories test, Happé et al. 1999). We expected:

i. Person with alcohol use disorder to show impaired ToM when compared with controls, in all the investigated dimensions, i.e. first and third-person ToM, egocentric and allocentric perspective, first and second-order ToM.

However, we also expected some aspects of ToM to be better preserved than others in AS. In particular, we expected:

ii. Second-order ToM to be more difficult than first-order ToM;

iii Third-person ToM to be more difficult than first-person ToM;

iv. For explorative purposes we also investigated whether a difference exists between tasks requiring an allocentric vs. egocentric perspective.

1. Methods

1.1. Participants

Twenty-two persons (15 men and 7 women; age: mean = 49.64 ± 8.08 years; years of formal education: mean = 11.77 ± 4.140) with a history of chronic abuse of alcohol (defined as per DSM-IV [42]) plus an equal number of healthy control subjects (CS),(15 males, 7 females, age: mean = 49.32 ± 8.173 years; years of formal education: mean = 12.05 ± 4.237) helped us to gather the present data. The length of alcohol abuse ranged from 36 to 480 months (mean = 137.236 ± 128.426), the age of onset of alcohol abuse ranged from 17 to 60 years (mean = 35.8 ± 11.76). All participants were being treated by Aliseo, an association in Turin that offers help and support to people with alcohol dependence; the association had been providing relief for 2 to 51 months (mean = 15.886 ± 14.126). All participants were native speakers of Italian. All were adults and abstinent from alcohol at the time of the interview; the length of abstinence ranged from 0 to 84 months (mean = 10.5 ±17.78). All but one of the subjects were receiving medications: 13 were receiving drugs specifically for alcohol dependence (*Disulfiram*), 4 anxiolytics, 2 antidepressants and 1 both antidepressants and specific medication.

Inclusion criteria for subjects with alcohol use disorder was a score of > III on Raven's Progressive Matrices, category considered as acceptable limiting based on Raven's criteria (Raven 1939). The exclusion criterion was a diagnosis of Korsakoff's syndrome.

Exclusion criteria for both subjects with alcohol use disorder and controls included an anamnesis of psychiatric, neurological or neuropsychological disease, leucotomy, head injury, and other substance abuse (defined as per DSM-IV, APA 1994).

1.2. Materials and procedures

1.2.1. Theory of Mind Assessment Scale

The participants were administered the Theory of Mind Assessment Scale (Th.o.m.a.s., Bosco et al. 2009a, Castellino et al. 2011) in order to use a unitary methodology to investigate the various aspects of ToM abilities and delineate a complete profile of those abilities.

The Th.o.m.a.s. is a semi-structured interview aimed at assessing a subject's theory of mind (see Appendix A). It consists of 39 open-ended questions that leave the interviewee free to express and articulate his/her thoughts. When they are not provided spontaneously by the interviewee, the interviewer may specifically ask for real-world examples to enrich and contextualize the answer. The interview is composed of questions organized along four scales, each focusing on one of the knowledge domains in which a person's ToM may be manifested.

- *Scale A, I–Me*. This investigates the interviewee's knowledge of her own mental states. The viewpoint of the questions is centered on the interviewee (I) reflecting on her own mental states (Me). This scale investigates first-person ToM.
- *Scale B, Other–Self*. This investigates the knowledge that, according to the interviewee, other persons have of their own mental states, independently of the subject's perspective. The viewpoint of the questions is centered on other persons (Other) reflecting on their own mental states (Self). This scale investigates third-person ToM from an egocentric perspective.

- *Scale C, I–Other*. This investigates the interviewee's knowledge of the mental states of other persons. The viewpoint of the questions is centered on the interviewee (I) reflecting on the others' mental states (Other). Both this scale and scale B investigate third-person ToM; however, here it is centered on the interviewee. This scale investigates third-person ToM from an allocentric perspective.
- *Scale D, Other–Me*. This investigates the knowledge that, from the interviewee's point of view, others have of her mental states. The viewpoint of the questions is centered on the other persons (Other) reflecting on the mental states of the interviewee (Me). This scale can be compared with a second-order ToM task, in that *the abstract form* of the questions is: ''What do you think that others think that you think?".

Each scale is divided into three subscales that, respectively, explore the dimensions of Awareness, Relation and Realization of mental states:

- *Awareness*. This investigates the interviewee's ability to perceive and differentiate beliefs, desires and emotions in herself and in others.
- *Relation*. This investigates the interviewee's ability to recognize causal relations between different mental states and between them and the resulting behaviors. For example: ''When you feel bad, do you feel you understand why?".
- *Realization*. This investigates the interviewee's ability to adopt effective strategies to achieve a desired state affecting one's own and others' mental states and behavior. For example: ''Do you succeed in getting what you want? How?".

Based on the most important types of mental states that a person is able to comprise (Tirassa 1999; Tirassa and Bosco 2008), the questions focus on the interviewee's perspectives on epistemic states

(knowledge, beliefs and so on), volitional states (desires, intentions and so on) and positive and negative emotions.

With the consent of the interviewees, all *Th.o.m.a.s.* interviews were tape-recorded and then transcribed. The transcriptions were rated by two independent judges, who had not taken part in the interviewing phase and were blind to whether each person whose answers they were coding belonged to the experimental or the control group. Each judge was asked to assign each answer a score from 0 to 4, according to the given rating criteria, and to enter it in the relevant box in the correction grid (Bosco et al. 2009a). For a complete description of rating criteria see Bosco et al. 2009a.

The two judges reached a significant level of inter-reliability on their first judgments of the answers given by subjects with alcohol use disorder and control subjects, considered separately, in both cases taking into account the total Th.o.m.a.s. scores (Correlation Coefficient: $6{,}86 < Z < 10{,}37$; $0{,}0001 < p < .0001$) (Correlation Coefficient: $2{,}37 < Z < 7{,}05$; $0{,}02 < p < 0{,}0001$). They discussed each item upon which they disagreed in order to reach a full agreement and assign the final score.

1.1.1. Strange Stories

In addition to the Tho.m.a.s, the Strange Stories test (Happé et al. 1999) was administered in vivo to both subjects with alcohol use disorder and controls.

We presented a selection of six Strange Stories, excluding those that require the comprehension of communicative acts such as metaphors and irony. An example is the following story: ‘‘A burglar who has just robbed a shop is making his getaway. As he is running home, a policeman on his beat sees him drop his glove. He doesn’t know the man is a burglar, he just wants to tell him he dropped his glove. But when the policeman shouts out to the burglar, ‘Hey, you! Stop’, the burglar turns round, sees the policeman and gives himself up. He puts his hands up and admits that he committed

the break-in at the local shop." The subject is asked: ''Why did the burglar do that?" In line with the literature (Happé et al. 1999) a correct interpretation of the situation requires the subject to assess the burglar's mental state and to realize that he misunderstood the policeman's intention, which was to give back the glove.

2. Results

2.1. Th.o.m.a.s.

Figure 1 shows the mean total scores for AS and CS on each individual Th.o.m.a.s. scale (A, B, C and D) and the total mean score on the Th.o.m.a.s.

[Insert Fig. 1 about here]

A repeated measures ANOVA was performed with a two-level between-subjects factor (*Group*: AS vs. CS) and a four-level within-subjects factor (*Th.o.m.a.s. scale type*: A, I-Me; B, Other-Self; C, Me-Other; D, Other-Me). There was a main effect for the type of group ($F_{(1,42)} = 26.559$; $p = .000$; $\eta = .387$). In line with our hypothesis, AS performed worse than CS on all the Th.o.m.a.s. scales. Furthermore, there was evidence of a main effect of the scale type ($F_{(3,42)} = 11.776$; $p = .000$; $\eta = .219$), and *the Group X Scale* interaction was also significant ($F_{(3,42)}) = 5.826$; $p = 001$; $\eta = .122$), indicating a different pattern of performance between AS and CS on the different *Th.o.m.a.s*. scales. To explore this result, we conducted a post-hoc pairwise comparison using a Bonferroni correction ($p < .05$) in both the subjects with alcohol use disorder and the control group. The test revealed a significant difference both in AS ($p = .001$) and in CS (p= .001), between Scale A, which assesses first-order ToM, and Scale D, which assesses second-order ToM. Both groups performed worse on

Scale D than on Scale A. Again in line with our hypothesis, post hoc test also revealed that AS (p = .001) – but not CS (p = .783) – performed worse on Scale B, which assesses third-person ToM, than on Scale A, which assesses first-person ToM. The post-hoc pairwise comparison also showed that AS (p = .05) – although again not CS (p = 1) – performed worse on Scale B, which assesses third-person ToM from an allocentric perspective, than on scale C, which assesses third-person ToM from an egocentric perspective. That is, when alcoholics had to reason about others' mental states (third-person ToM), they found it harder to take an allocentric than an egocentric perspective. Figure 2 shows the mean total score for both groups on the three *Th.o.m.a.s* subscales (*Awareness, Relation* and *Realization*). For explorative purposes a repeated measures ANOVA was performed with a two-level between-subjects factor (*Group*: AS vs. CS) and a three-level within-subjects factor (subscale type: Awareness, Relation, Realization). The analysis revealed a main effect of the type of group ($F_{(1,42)} = 23.557$; $p < .000$; $\eta = .359$), indicating that AS obtained lower overall scores than CS. There was no significant effect for the dimension subscale types ($F_{(2,42)} = 2.460$; $p < .92$), indicating that the participants' scores did not vary according to the subscale type involved. The *Group* X *Subscale* type was not significant either ($F_{(2,42)} = 1.477$; $p = .234$), indicating that the pattern of performance among subscales did not differ between groups. The post-hoc pairwise comparison with Bonferroni correction ($p < .05$) revealed no differences among subscales in both AS and CS.

[Insert Fig. 2 about here]

Figure 3 shows the mean score for the AS and control groups for each kind of mental state scale (beliefs, desires, positive and negative emotions). For explorative purposes a repeated measures ANOVA was performed with a two-level between-subjects factor (*Group*: AS vs. CS) and a four-

level within-subjects factor (mental state type: beliefs, desires, positive and negative emotions). This analysis showed a main effect of the type of group ($F_{(1,42)} = 26.963$; $p < .000$; $\eta = .391$), indicating that AS obtained lower scores than CS. There was also a main effect for the mental state type ($F_{(3,42)} = 8.557$; $p < .000$; $\eta = .169$). The *Group* X *mental state type* was not significant ($F_{(3,42)} = .597$; $p = 6.18$). The post-hoc pairwise comparison with a Bonferroni correction revealed differences in performance among the mental state types for CS: they performed better when they answered questions concerning desires than both negative ($p = .023$) and positive ($p = .024$) emotions (not the same for AS: $p = .077$, $p = .1$); the other comparisons did not reveal any significant differences ($.60 < p < .1$).

[Insert Fig. 3 about here]

2.2. Strange Stories task

Contrary to our expectations, a t-test revealed that there was no significant difference between AS (mean = .849 ± .166) and CS (mean = .933 ± .117) on the *Strange Stories* task, although the percentages went in the expected directions.

2.3. Correlations within the sample of AS

Several correlations were carried out within the AS sample in order to explore possible relationships between the overall scores on the *Th.o.m.a.s.* and clinical variables of interest (age, education, time of abstinence, time of relief, time of abuse). No significant relationships were found between the *Th.o.m.a.s.* scores and the above-mentioned variables, with the exception of a negative correlation (Pearson's Correlation : r = -.596; p = .003) between the AS overall score on the *Th.o.m.a.s.* and the time of abuse (see Table 1).

[Insert Table 1 about here]

3. Discussion

The aim of the research was to explore ToM impairments in case of severe chronic alcohol abuse (*i.e.* alcoholism). We adopted the Strange Stories test (Happé et al. 1999) (an advanced ToM test) and the Th.o.m.a.s. (a ToM direct interview (Bosco et al. 2009a, 2009; Castellino et al. 2011) to provide a complete assessment of such complex cognitive ability. Overall, the analysis showed poorer performance by the AS group compared to the CS on each of the individual scales of the Th.o.m.a.s. (Scale A:first-person ToM; Scale B: third-person ToM from an allocentric perspective; Scale C: third-person ToM from an egocentric perspective; Scale D: second-order ToM task). In line with the current literature (Uekermann and Daum 2008), these findings support our hypothesis that AS suffer from a deficit in their ability to understand and attribute mental states in all the aspects of ToM investigated, that is first and third-person ToM, egocentric and allocentric perspectives and first vs. second-order ToM. Our results also revealed that the pattern of differences between groups varied across the different Th.o.m.a.s. scales; in particular AS performed worse on Scale D (second-order ToM) than on Scale A (first-order ToM) and they performed worse on Scale B (third-person ToM allocentric perspective) than on both Scale A (first-person ToM) and C (third-person ToM egocentric perspective). These findings indicate, for the first time in the current literature, that AS find it more difficult to make third-person than first-person considerations about mental states and that when they adopt a third-person perspective they experience more difficulty from another person's perspective than from a perspective centered on the self.

AS also achieved lower overall scores on each of the three subscales (awareness, relation, realization); the participants' scores did not vary according to the subscale type involved. The pattern of performance among subscales did not differ between groups.

Our results are in line with the current literature, that suggests a general impairment of social cognition in AS (Foisy et al. 2005, 2007a, 2007b; Kornreich et al. 2001, 2002; Phillipot et al. 1999; Maurage et al. 2008, 2009, 2011a; Monnot et al. 2001; Townshed and Duka 2003; Uekermann et al. 2005; Uekermann and Daum 2008). Still, few studies have focused specifically on ToM abilities. What Uekermann and colleagues (Uekermann et al. 2007) found, for example, is that in humor processing AS showed deficits related to theory of mind and executive functions.

Finally AS achieved lower overall scores on each kind of mental state (beliefs, desires, positive and negative emotions). There was no significant difference between groups in the pattern of performance among mental state types. When exploring these data we expected to find significant differences between emotions and belief/desires, because the literature that supports the distinction between 'affective' and 'cognitive' components of social cognition (Maurage et al. 2011; Gizewski et al. 2012) claims that impairments in AS are more specifically related to 'affective' components (see also (Foisy et al. 2007b; Maurage et al. 2008). In this specific sense, our data revealed instead a general impoverishment of ToM abilities in AS. However, we suggest that this issue be further evaluated, since the difference between cognitive and emotional components of social cognition was not the central focus of our investigation. Surprisingly our data revealed no significant difference between performance by alcoholics and controls on the *Strange Stories* task (Happé et al. 1999), although the percentages went in the expected directions. This unexpected datum could be due to the fact that, although this is an advanced ToM task, it has been created to evaluate ToM in developmental phases and might not be sensitive enough to evaluate ToM abilities in adults.

No significant relationships were found between overall scores on the *Th.o.m.a.s.* and the clinical variables of interest (age, education, time of abstinence, time of relief, time of abuse). These data suggest that the ToM deficit in AS was substantially independent of other individual factors. The only exception is for the variable 'time of abuse', that was negatively correlated with both the overall scores and each Scale sub-score. These data suggest a general progressive impairment of ToM abilities linked to the abuse of alcohol, that might be consistent with theories regarding brain damage, in particular with the 'frontal lobe hypothesis', i.e. the hypothesis of a disproportionate vulnerability of the prefrontal cortex to the neurotoxic effects of alcohol (Uekermann and Daum 2008; Moselhy et al. 2001). However, future studies are needed to investigate whether and to what extent a ToM weakness in these subjects preceded the alcohol abuse, in order to establish the possibility of considering a ToM weakness as a co-morbidity factor in the etiology of the abuse.

To conclude, this is the first study to provide a complete and detailed assessment of ToM in subjects with alcohol use disorder, exploring its complex nature made up of differentiated but related abilities, going beyond the classical focus of ToM on the third-person allocentric perspective. Our data suggest that future studies should focus on the relevance of the different ToM impairments as predictors of treatment outcome in alcoholism, and on the possibility of proposing different rehabilitative interventions on the basis of ToM assessment. A temptative suggestion, for example, might be to use first-person social reasoning, which is less impaired than reasoning on the third person, as a lever for the rehabilitation of the latter.

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Appendix A

The interview

This appendix contains the complete interview, divided into subscales. Th.o.m.a.s. being a semi-structured interview means that the interviewee's replies may sometimes anticipate questions that would have been the subject of a specific question at a later point. Analogously, explanations and examples may or may not be spontaneously offered by the interviewee. Therefore, a certain redundancy is present in the interview as it is reported here; this serves to remind the interviewer to ask for all the information needed, unless it has been spontaneously provided by the interviewee.

A.1. Scale A (I–Me)

[1] Do you happen to experience emotions that make you feel good? What? On what occasions? Can you give an example?

[1a] (If the answer is negative) Why not?

[2] When you feel good, does that make any difference to you? What are the differences? Can you give an example of how you act or think, or of things that happen to you when you feel good?

[3] Do you happen to experience emotions that make you feel bad? What? On what occasions? Can you give an example?

[3a] (If the answer is negative) Have you ever asked yourself why?

[4] When you feel bad, does that make any difference to you? What are the differences? Can you give an example of how you act or think, or of things that happen to you when you feel bad?

[5] When you feel bad, do you feel you understand why? Can you give an example?

[6] Can you change your mood, when you want to? How? On what occasions? Can you give me an example?

[6a] (If the answer is negative) Why not?

[7] Do you happen to have wishes, and know what you want? What? On what occasions? Can you give an example?

[7a] (If the answer is negative) Do you ever ask yourself why?

[8] Do you try to fulfil your wishes? How? On what occasions? Can you give an example?

[8a] (If the answer is negative) Why not?

[9] Do you succeed in getting what you want? How? On what occasions? Can you give an example?

[10] Can you explain why you succeed/do not succeed?

A.2. Scale B (Other–Self)

[11] Do the other persons happen to experience emotions that make them feel good? What? On what occasions? Can you give an example?

[11a] (If the answer is negative) Why not, in your opinion?

[12] When the others feel good, does that make any difference to them? What differences does it make? Can you give an example of how they act or think, or of things happening to them when they feel good?

[13] And do the other persons happen to experience emotions that make them feel bad? What? On what occasions? Can you give an example?

[13a] (If the answer is negative) Why not, in your opinion?

[14] When the others feel bad, does that make any difference to them? What differences does it make? Can you give an example of how they act or think, or of things happening to them when they feel bad?

[15] In your opinion, when the others feel bad, do they understand why? Can you give an example?

[15a] (If the answer is negative) Why don't they understand, in your opinion?

[16] And, in your opinion, can the others change their mood when they want to? How? On what occasions? Can you give an example?

[16a] (If the answer is negative) Why not, in your opinion?

[17] Do the others happen to have desires and know what they want? What sorts of desires do they have? Can you give an example?

[17a] (If the answer is negative) Why not, in your opinion?

[18] Do the others try to fulfil their desires? How? On what occasions? Can you give an example?

[18a] (If the answer is negative) Why don't they try, in your opinion?

[19] In your opinion, do the others succeed in getting what they want? How? On what occasions? Can you give an example?

[20] Why do/don't they succeed, in your opinion?

A .3. Scale C (I–Other)

[21] Do you notice when the others feel good? When does that happen? Can you give an example?

[21a] (If the answer is negative) Why don't you notice?

[22] When you notice that another person feels good, does that make any difference to you? What differences does it make? Can you give an example, of how you act or think, or of the things that happen to you?

[23] Do you notice when the others feel bad? When do you notice that? Can you give an example?

[23a] (If the answer is negative) Why don't you notice?

[24] When you notice that another person feels bad, does that make any difference to you? What differences does it make? Can you give an example of how you act or think, or of the things that happen to you?

[25] When the others feel bad, do you understand why? Can you give an example?

[25a] (If the answer is negative) Why can't you explain why other people feel bad?

[26] Do you ever want to influence the mood of the others? How? On what occasions? Can you give an example?

[27] Do you succeed in doing so? How? On what occasions? Can you give an example?

[28] How do you explain the fact that you manage/do not manage to do so?

[29] Do you think you understand the others' wishes? What sort of wishes do they have? Can you give an example?

A.4. Scale D (Other–Me)

[31] Do the others notice when you feel good? When do they notice? Can you give an example?

[31a] (If the answer is negative) Why don't they notice?

[32] When the others notice that you feel good, does that make any difference to them? What difference does it make? Can you give an example of how they act or think when they notice that you feel good?

[33] Do the others notice when you feel bad? When do they notice? Can you give an example?

[33a] (If the answer is negative) Why don't they notice?

[34] When the others notice that you feel bad, does that make any difference to them? What difference does it make? Can you give an example of how they act or think when they notice that you feel bad?

[35] When you feel bad, do the others understand why? Can you give an example?

[35a] (If the answer is negative) Why don't they understand?

[37] Can the others influence your mood? How? On what occasions? Can you give an example?

[38] How do you explain that they succeed/do not succeed in doing so?

[39] Do you think that the others understand your desires? In your opinion, what sort of wishes do they think you have? Can you give an example?

Figures

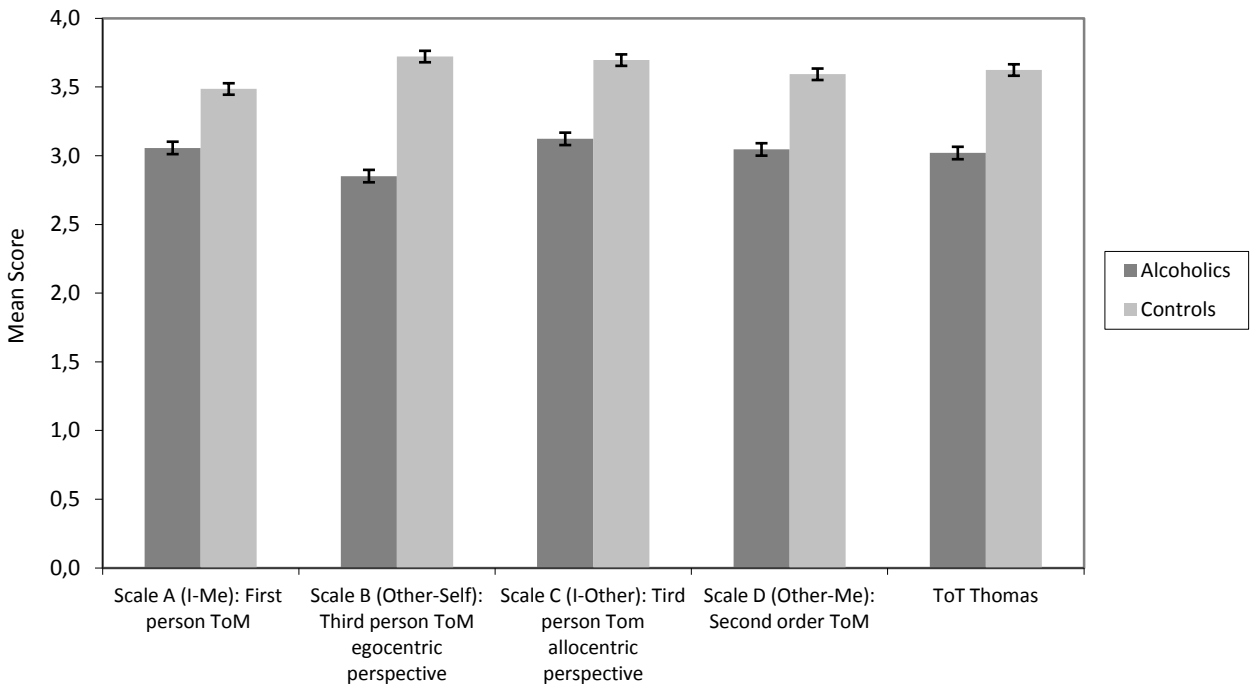

Fig. 1: Alcoholics' vs. controls' scores on the individual scales and on the total Th.o.m.a.s., with standard error bars

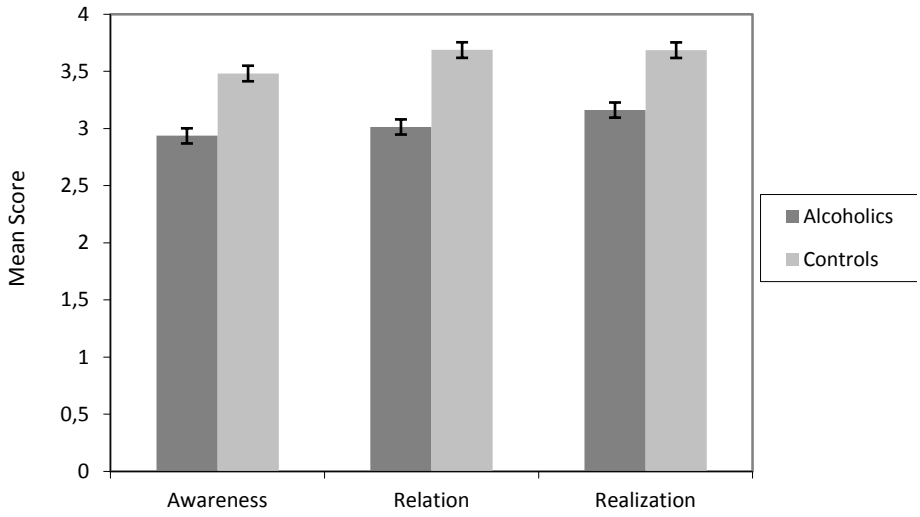

Fig.2: Alcoholics' vs. controls' scores on the three Th.o.m.a.s. subscales, with standard error bars.

Fig. 3: Alcoholics' vs. controls' scores on the four mental states assessed by the Th.o.m.a.s., with standard error bars.

	Age	Education	Time of Therapy	Onset	Abstinence	Time of abuse
Th.o.m.a.s.						
Total Score	-.290	.194	-.115	.089	-.223	-.596**
Scale						
A (I-Me)	-.230	.138	-.046	.1	-.234	-.566**
B (Other-Self)	-.244	.099	-.102	-.012	-.155	-.453*
C (I-Other)	-.281	.293	-.065	.112	-.132	-.585**
D (Other-Me)	-.301	.177	-.196	.130	-.298	-.480*

* $p < .05$
** $p < .01$

Table 1: Correlations between the overall Th.o.m.a.s. score, Th.o.m.a.s. scales, age, education, time of therapy, outset, length of abstinence, time of abuse.