Mindreading abilities in sexual offenders: An analysis of theory of mind processes.

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21 February 2025

Mindreading abilities in sexual offenders: An analysis of theory of mind processes

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A B S T R A C T

The paper aims to assess the theory of mind (ToM) of sexual offenders. We administered to 21 sexual offenders and to 21 nonoffenders two classical first- and second-order ToM tasks, a selection of six Strange Stories, and a semi-structured interview, the Theory of Mind Assessment Scale (Th.o.m.a.s), which provides a multi-dimensional evaluation of ToM, investigating first- vs. third-person and egocentric vs. allocentric perspectives. Results show that sexual offenders performed worse than controls on second-order ToM tasks, on Strange Stories and on each of the Th.o.m.a.s dimensions, whereas they did as well as the control group on first-order ToM tasks. A detailed analysis of participants' performance on Th.o.m.a.s. showed that sex offenders performed worse on the third-person than on the first-person ToM scale, and worse on the allocentric than on the egocentric perspective; these findings did not apply to the controls. Implications for future research and treatment are discussed.

1. Introduction

Human social interactions are based, among other things, on the ability to detect cognitive and emotional processes in others (Frith & Frith, 2001; Tomasello, Carpenter, Call, Behne, & Moll, 2005). The attribution of mental states, such as emotions, beliefs and intentions, to oneself and to others has been defined as 'Theory of Mind' (Premack & Woodruff, 1978) or 'Mindreading' (Baron-Cohen, 1995). Mindreading ability enables us to predict and explain the behavior of others by detecting their underlying motivations, and thereby to regulate our attitudes and behaviors toward other people (Astington, 2003; Nichols & Stich, 2003a; Paal & Bereczkei, 2007).

Research and theorizing on mindreading abilities began in the late 1970s and early 1980s, starting with the seminal paper by Premack and Woodruff (1978): "Does the chimpanzee have a theory of mind?" From this initial focus on primates, research interest spread to the field of developmental psychology, focusing on mindreading abilities in children (Baron-Cohen, Leslie, & Frith, 1985; Wellman, 1985; Wimmer & Perner, 1983). The capacity of children to recognize that other people have thoughts and desires that are not necessarily like their own, emerges during the second year of life (Onishi & Baillargeon, 2005) and continues to develop until adolescence (Dumontheil, Apperly, & Blakemore, 2010). Theory of mind deficit has been

considered a key concept in explaining disordered behaviors such as autism (Baron-Cohen, 1995; Happé, 1993), schizophrenia (Frith, 1992) and personality disorders (Semerari et al., 2005).

Ward and his colleagues (Keenan & Ward, 2000; Ward, Keenan, & Hudson, 2000) have argued that a theory of mind perspective could be adopted as a framework to explain the interpersonal, affective and cognitive problems underlying sexual offending. Evidence suggests that sexual offenders have difficulties in establishing satisfactory adult intimate relationships (Marshall & Marshall, 2010), that they lack skills in managing interpersonal relationships (Marshall, 1993; Ward, Hudson, & Marshall, 1996), that they fail to cope with stressful events (Serran, Firestone, Marshall, & Moulden, 2007), and that they also have emotional regulation impairments (Marshall, Marshall, Serran, & Fernandez, 2006; Ward, Hudson, & Keenan, 1998). It has been suggested that these deficits, and the sexually aggressive behavior more generally, could be exacerbated by various cognitive distortions (Bumby, 1996), or by deficits in their 'implicit theories' (Mihailides, Devilly, & Ward, 2004; Polaschek & Ward, 2002; Ward & Keenan, 1999). For instance, a common implicit theory among child molesters is that children are suitable sex objects; this implicit theory contains a false assumption that children desire sex like adults do, because, like adults, they are driven by a desire for pleasure; the attribution of this wrong belief could generate a cognitive distortion that ultimately leads to a wrong interpretation of others' behavior (see Keenan and Ward, 2002, chap. 7). That is, cognitive distortions may be related to theory of mind, because they involve either an inability or a deficiency in the ability to mindread accurately. An analysis of the adequacy of sexual offenders' theory of mind functioning could provide a basis for a better understanding of the development of wrong theories and distorted cognitions, that negatively influence sexual offenders' interpersonal relationships and may lead to sexual offending.

As Keenan and Ward (2000) point out, a theory of mind perspective could indeed offer a unifying explanation for the deficits exhibited by sexual offenders as mentioned above. In particular, Ward et al. (2000) hypothesized that sexual offenders suffer from a lack of understanding other people's beliefs, emotions and perspectives. They suggested that individuals who are unable to comprehend the feelings of others, or to understand the interpretations other people have of interpersonal situations, will be less able to resolve relational and emotional conflicts effectively. In more detail, the authors (Ward et al., 2000) argued that sexual offenders may show a general impairment in their ability to process information about their own and others' mental states, or they may just have certain specific deficits regarding mental states in specific relationships (e.g. they might not be able to understand a partner's desires or beliefs in the context of a romantic relationship) or with certain kinds of people (e.g. they might fail to understand a woman's or a child's beliefs and emotions).

A body of empirical studies has focused on some of these features of sexual offenders, highlighting deficits in emotional recognition and empathy (Gery, Miljkovitch, Berthoz, & Soussignan, 2007; Hudson et al., 1993; Varker, Devilly, Ward, & Beech, 2008), problems in perspective-taking (Hanson & Scott, 1995), and identifying several implicit theories and distorted cognitions, such as sex offenders' belief that some people are legitimate victims (Hanson, 1998). Nevertheless, none of these studies has focused specifically on theory of mind. The only study (Elsegood & Duff, 2010) that we could find using such an approach, involved an examination of child molesters that employed both the *Reading the Mind in the Eyes* task (RME, Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), a task requiring the inference of mental states from adults' eyes, and an adapted version, *The Mind in a Child's Eyes* task (MCET; Duff & Schulte-Mecklenbeck, 2010), which requires mental states to be inferred from children's eyes. They showed that the performance of child molesters was significantly worse than controls on the RME, whereas no differences were found between groups on the MCET. However, as the authors noted, a possible limitation of the study was that the measures adopted assess theory of mind from static photographs, whereas in reality mental states are usually inferred from several dynamic verbal and non-verbal stimuli.

Considering the relative lack of empirical research on this topic, we decided to assess the theory of mind abilities in a sample of incarcerated sexual offenders. The theory of mind processes involve complex and multi-component functions, incorporating related but different abilities (Saxe, Moran, Scholz, & Gabrieli, 2006; Tirassa, Bosco, & Colle, 2006a, 2006b). We decided, therefore, to employ several tasks measuring various aspects of theory of mind processes in order to assess first- and second-order issues, first- and third-person perspectives, and egocentric and allocentric aspects. Furthermore, we also evaluated advanced theory of mind aspects (using *the Strange Stories* Task from Happé, Brownell, & Winner, 1999), in addition to the understanding of first-order and second-order beliefs.

First-order tasks assess the ability to infer the thoughts or intentions of another person (usually referred as first-order beliefs). It has been found that children are able to solve these kinds of tasks starting from age three to four years (Wimmer & Perner, 1983). By contrast, second-order tasks require the ability to deal with doubly embedded representations; that is, the awareness not just that other people have beliefs about the world, but that they also have beliefs about the contents of others' minds. It has been shown that, at seven years of age, children are able to represent and reason about second-order beliefs (Perner & Wimmer, 1985). The distinction between performance on first- and that on second-order beliefs has been demonstrated in normally developed children (Wellman & Liu, 2004) as well as in schizophrenia patients (Mazza, De Risio, Surian, Roncone, & Casacchia, 2001). These studies have shown that first-order theory of mind tasks are easier to solve than second-order tasks.

Nichols and Stich (2003a, 2003b) argued that another distinction can be drawn between first- and third-person theory of mind. They noted that these are different activities mediated by different processes and that they involve knowledge of a different type. First-person theory of mind understanding describes self-knowledge (i.e. the awareness of our own beliefs or desires), whereas third-person theory of mind requires the ability to understand the beliefs, desires and emotions of others. An fMRI study conducted by Vogeley et al. (2001), who found different patterns of brain activation in different lobes when healthy subjects took the first- or the third-person perspective respectively, supports this view. This research

demonstrates, for example, that there are specific brain regions involved in representing self-mental states only, brain areas specifically involved in representing only the mental states of others, and there are other brain areas involved in both these processes. Unfortunately, the standard false-belief tasks focus solely on belief ascription to others (Nichols & Stich, 2003a, 2003b), hence the need to employ additional measures.

Another distinction, orthogonal to that between first- and third-person theory of mind, can be drawn between egocentrism and allocentrism (Frith & De Vignemont, 2005). In the egocentric perspective, others are viewed in relation to the self; in the allocentric perspective, however, the mental states of others are represented independently from the self, (for a review of empirical researches in neuroscience showing that different brain regions process various aspects of ToM, see Abu-Akel, 2003).

In the light of these considerations, the aim of the present investigation is to conduct a broad assessment of theory of mind abilities in sexual offenders; our hypotheses are the following:

   (i) sexual offenders will show general deficits of theory of mind, compared to nonoffenders;
  (ii) the sexual offender group will perform worse on third-person tasks than on first-person tasks;
 (iii) the sexual offender group will perform worse on tasks requiring an allocentric perspective than on tasks requiring an egocentric perspective;
 (iv) and finally, the theory of mind deficits that we expect to observe in sexual offenders will correlate with their estimated risk of reoffending; specifically, we expect that the lower will be the sexual offenders' theory of mind ability, the higher their risk of reoffending.

2. Method

2.1. Participants

Twenty-one adult males convicted of sexual offences were recruited from two large industrial cities in northern Italy. These offenders had either been incarcerated or were on some form of conditional release in the community. Fourteen participants had been convicted of child sexual abuse and seven of rape. The child molester group comprised six extrafamilial and eight intrafamilial child molesters. The victim's gender distribution for this group was as follows: two male, nine female and three both male and female; for the rapist group, all the victims were female. The length of conviction ranged from 0 to 10 years (mean: 5.5 ± 2.7). The overall risk of recidivism was estimated to be medium as determined by the *Risk Matrix 2000* (Thornton et al., 2003).

All sexual offenders were assessed prior to beginning a treatment program. They were provided with an information sheet, and a written informed consent form was signed by all the participants prior to the assessment. The study was approved by the Director and the License Office of the Prison Service, in terms of both the ethical status of the project and its potential value to the Prison Service.

Sex offenders underwent a preliminary evaluation by the prison psychodiagnostic staff shortly before the study, as part of the assessment to be included as a participant in the treatment program. According to these evaluations, participants selected for the present study did not show any executive or language impairment, or learning disabilities, as diagnosed by the scientific staff; only one participant was excluded from the study because he failed to meet the inclusion criteria. The inclusion criteria for sexual offenders were as follows: a) IQ > 80, evaluated using the Eta/Beta task (Ferradini, 1990); and b) no non-paraphilic Axis I or Axis II DSM diagnosis (APA, 1994), evaluated by the Italian version of the Millon Clinical Multiaxial Inventory (MCMI-III. Millon, 1994).

Furthermore, during the clinical assessment phase, the prison psychodiagnostic staff also carried out substance use/abuse assessments on the sex offender group. The results were that three participants had been diagnosed as alcohol abusers for a period in their life, nine were occasional alcohol abusers and nine have never abused alcohol; at the time of the experiment, however, no participant was taking alcohol or drugs. To monitor the role of this variable on sex offenders' performance on ToM tasks, we performed a one-way ANOVA, which showed that the past alcohol abusers ($N = 12$) did not differ significantly from the non-abusers ($N = 9$) on the overall score for the ToM tasks ($F_{(1,19)} = .19$, $p = .67$, ns) and on the total score for Th.o.m.a.s ($F_{(1,19)} = .03$, $p = .87$, ns). Moreover, the psychodiagnostic staff diagnosed two persons as drug abusers for a period in their lives, nine persons as occasional drug users, whereas ten persons had never used drugs. To monitor the impact of this variable too on sex offenders' performance on ToM tasks, we performed a one-way ANOVA, which showed that the past drug users ($N = 11$) did not differ significantly from non-abusers ($N = 10$) on the overall score for the ToM tasks ($F_{(1,19)} = .83$, $p = .37$, ns) and on the total score for Th.o.m.a.s ($F_{(1,19)} = .86$, $p = .37$, ns). These participants were therefore also included in the final sample of sex offenders. A further reason to not exclude from our experimental group people who had abused alcohol or drugs in the past, was that the literature (Kraanen and Emmelkamp (2011), for a review) showed that a history of substance abuse or misuse is quite common among sex offenders; therefore, we decided to include them in our study because our aim was to investigate a representative sample of the sex offender population.

A comparison group of 21 healthy male participants was recruited from a non-academic population in a large industrial city in northern Italy, adopting a snowball sampling approach via contacts of the first author. Participants were selected according to various relevant criteria, such as age, education and absence of declared learning disabilities.

The two groups were matched for age (sexual offenders: mean = 44.3 ± 14.5; comparison group: mean = 44.4 ± 15.3) and years of formal education (sex offenders: mean = 10.6 ± 3.9; comparison group: mean = 10.9 ± 3.9). There were no differences between groups in marital status or level of occupational status. Finally, it should be noted that both groups contained foreign participants (i.e. from outside Italy): in the sex offender group, sixteen were native Italian speakers whereas five were foreigners, and in the control group there were three foreigners. Both the foreigners sex offenders (mean = 12 ± 4.9) and the controls (8.3 ± 2.9) had been living in Italy for at least 5 years and showed good knowledge of the Italian language, as assessed by a native Italian speaking interviewer. Furthermore, we performed a control statistical analysis on our data by excluding the foreigners from both groups; the results showed that the sex offenders (N = 16) differed significantly from the controls (N = 18) on the overall score for the ToM tasks (one-way ANOVA; $F_{(1,32)}$ = 23.14, p < .001) and on the total score for Th.o.m.a.s (one-way ANOVA; $F_{(1,32)}$ = 67.30, p < .001). Considering this finding we decided to include also foreigners in our study.

2.2. Materials and procedures

2.2.1. Demographic and offence-related variables
Demographic information was collected during the first session for each participant. Offence-related information for the sexual offender group was extracted from information provided by the courts and from official files. This information also provided the basis for scoring the *Risk Matrix 2000*. In more detail, the Risk Matrix 2000 (RM2000; Thornton et al., 2003) is an actuarial risk measure that was developed to assess the risk of sexual and violent reoffending among adult males convicted of sexual offences. The measure evaluates the static risk factors, which are commonly considered for a long-term risk assessment (Beech, Fisher, & Thornton, 2003). The RM2000 comprises two scales: the Scale-S/Sex and the Scale-V/Violence; the scores obtained on these scales can be combined to give a score of the overall risk of reconviction, in one of the following risk categories: low risk (score = 0), medium risk (score = 1–2), high risk (score = 3–4) and very high risk (score = 5–6).

2.2.2. Theory of mind assessments
2.2.2.1. Classical tasks.
The following measures (hereafter referred to as ToM tasks) were used to assess the theory of mind competences of both the sexual offender and the comparison group.

- First-order ToM tasks

Two tests were adopted to measure this concept: a modified version of the *Smarties* test, called the Cigarettes test (Pickup & Frith, 2001) and the *Sally-Anne* test (Baron-Cohen et al., 1985). Both the *Cigarettes* and *Sally-Anne* tasks investigate first-order theory of mind, requiring the attribution of a person's false belief about the identity or location of an object (see Appendix A.1).

- Second-order ToM tasks

Two tests – *The Burglar story* (Happé & Frith, 1994) and the *Ice-Cream Van story* (Baron-Cohen, 1989) – were employed for this purpose (see Appendix A.2). Both these tests adopt a similar strategy called the 'double-bluff story', where the participant must attribute a story character's false belief about another character's belief that is investigated by asking a specific question to the participant (see Appendix A.2); the correct answer requires an ability to understand second-order belief.

- Advanced ToM tasks

The *Strange Stories* Task (Happé, 1994) is an advanced or 'higher level' theory of mind task. We selected six *Strange Stories* from the adapted set of stories by Happé et al. (1999), including those stories measuring the comprehension of complex mental states, such as misunderstanding and double bluffing (see Appendix B). Each story contained two test questions: the comprehension question, which usually took the form, "Was it true what X said?", and the justification question(s), which usually took the form, "Why did X say that?" The last question requires an inference about the speaker's/actor's intentions; correct performance requires attribution of mental states such as desires, beliefs or intentions, and sometimes higher-order mental states such as one character's belief about what another character knows. The scoring procedure follows that described by Happé (1994).

All these classical tasks were administered individually to the participants. Both the second-order tasks and the six Strange Stories were presented in a large (18-point) font on a paper sheet, one at a time. At the same time, the story was read aloud. The story remained in front of the participants while the questions were asked. We adopted this procedure because it has been suggested that, in addition to reducing memory load, the practice of providing test material in written as well as verbal form increases participants' attention to and engagement with the activity (Kaplan, Brownell, Jacobs, & Gardner, 1990).

2.2.2.2. Theory of Mind Assessment Scale.
In addition to these frequently employed classical measures, the participants were administered the *Theory of Mind Assessment Scale* (Th.o.m.a.s.; Bosco et al., 2009), a semi-structured interview developed to assess several components of the theory of mind. This measure provides a more complete and detailed profile of this cognitive function and is described in more detail in Bosco et al. (2009). *Th.o.m.a.s.* consists of 39 open-ended questions that

leave the interviewees free to express and articulate their thoughts. The interviewer was trained to explain the questions to the participant in full on request at any time during the assessment, and this procedure was adopted to control for task-related demands, such as memory, language or attention.

The questions are organized into four scales, each focusing on one of the knowledge domains in which a person's theory of mind may manifest itself:

(1) *Scale A, I–Me*. This scale investigates the interviewee's knowledge of his/her own mental states. The questions require the interviewee (I) to reflect on his/her own mental states (Me). This scale investigates first-person theory of mind from an egocentric perspective.

(2) *Scale B, Other–Self* This investigates the interviewee's awareness that other people have of their own mental states independently of the participant's perspective. The questions center on the other people (Other) reflecting on their own mental states (Self). This scale investigates third-person theory of mind from an allocentric perspective.

(3) *Scale C, I–Other*. Here the questions evaluate the interviewee's knowledge of the mental states of other people. The questions involve the interviewee (I) reflecting on the other person's mental state (Other). This scale is similar to scale B, in that they both investigate third-person theory of mind; however, while Scale B takes the perspective of the other person, Scale C takes that of the interviewee. This scale, therefore, investigates third-person theory of mind from an egocentric perspective.

(4) *Scale D, Other–Me*. The questions on this Scale examine the interviewee's awareness that other people form ideas about what is in the mind of others. In other words, the questions focus on the other person (Other) reflecting on the mental states of the interviewee (Me). This scale can be compared with a second-order ToM task, because the abstract form of the questions is: *"What do you think that the others think that you think?"*

Each of these scales is also divided into three subscales that, respectively, explore the aspects of awareness, relation and realization in terms of mental states.

Awareness investigates the interviewee's ability to perceive and differentiate beliefs, desires and emotions in him/herself and in others. Recognizing different types of mental state is a necessary precondition for understanding their links with one another and with the external world.

Relation investigates the interviewee's ability to recognize causal relations between different mental states and between these states and the resulting behaviors. For example: *"When you feel bad, do you feel you understand why?"* In order to generate an explanatory theory of mind, we need to be able to connect different mental states, and to understand how they interrelate and how they affect and are affected by perceptions and actions.

Realization investigates the interviewee's ability to adopt effective strategies to achieve a desired state. For example: *"Do you succeed in getting what you want? If so, how?"* To act adaptively, it is necessary not only to have a theory of the causal relations between mental states, and between the mental states and the world, but also to be able to use this knowledge appropriately and successfully to affect one's own mental states and behavior and those of others.

Based on current theorizing on the most important types of mental states that an agent's cognitive architecture has to comprise (Tirassa, 1999; Tirassa & 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.

All the *Th.o.m.a.s.* interviews were tape-recorded and then transcribed, with the written authorization of the interviewees. The transcripts were rated by two independent judges, who had not participated in the interviewing phase, and were blind as to whether the participants were in the offender or comparison group. Each judge assigned each answer a score from 0 to 4, according to the rating criteria, and then inserted the score in the relevant cell of the correction grid (the whole structure of the interview, coding criteria and scoring grid may be found in Bosco et al. (2009)). The judges reached a satisfactory and significant level of inter-rater reliability in terms of their initial judgments (Cohen's K test: $K = .78$, $p < .001$). For the final score assignment, the judges discussed each item upon which they disagreed until full agreement was reached. The judges also scored the classical theory of mind tests, following the relevant criteria of assigning 0 to each incorrect answer and 1 to each correct one.

3. Results

3.1. Overview of the theory of mind assessment

ANOVAs were conducted to investigate the patterns of scores for the sex offender and control groups on both the classical theory of mind (ToM) tasks and the Th.o.m.a.s. In addition, t-tests were performed to investigate the sexual offenders and controls' performance on each ToM task and on each of the Th.o.m.a.s. scales, subscales and dimensions.

We report our results in more detail below, discussing the classical ToM tasks and the Th.o.m.a.s. task in separate sections.

3.1.1. Classical ToM tasks

Fig. 1 shows the mean total scores for the sexual offender and nonoffenders groups on each of the classical ToM tasks. This includes the first-order tasks (*Cigarettes Task* and *Sally-Anne Task*), the second-order tasks (the *Ice-Cream Van* and the *Burglar Stories*), and the advanced theory of mind task (a selection of six *Strange Stories*).
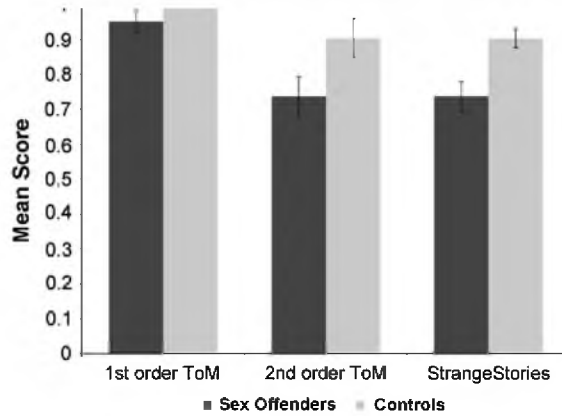
Fig. 1. Sexual offenders' vs. nonoffenders' scores on the classical ToM tasks, with standard error bars.

An ANOVA was applied with a two-level between-subjects factor (*Group*: sexual offenders vs. nonoffenders) and a three-level within-subjects factor (*ToM task type*: first-order, second-order and Strange Stories) with the aim of investigating whether the sex offenders' performance at the three classical ToM tasks (i.e. first-order tasks vs. second-order tasks vs. Strange Stories) was worse than that of the controls. The results revealed a main effect of the type of group ($F_{(1,40)}$ = 15.90; $p < .001$); overall, sexual offenders received significantly lower scores than nonoffenders on the classical ToM tasks. In more detail, a series of t-tests revealed that the sex offenders' performance was equal to that of the control group on the first-order ToM tasks (t-test: $t = -1.45$, $p = .16$), whereas they performed worse than the controls on both the second-order ToM tasks and the Strange Stories (t-test: t ranging from 3.82 to 4.14, p ranging from .001 to .04). There was also a main effect of the ToM task type ($F_{(2,39)}$ = 16.72; $p < .001$), indicating that the participants' scores varied according to the task type involved. The *Group X task type* interaction was not significant ($F_{(2,39)}$ = 2.45; $p = .10$), thus indicating no evidence that the pattern of differences across different tasks might vary between sex offenders and controls.

3.1.2. Th.o.m.a.s. task

Fig. 2 shows the mean total score for the sexual offender and nonoffender groups on each individual Th.o.m.a.s. scale (A, B, C and D) and the total mean score at Th.o.m.a.s.
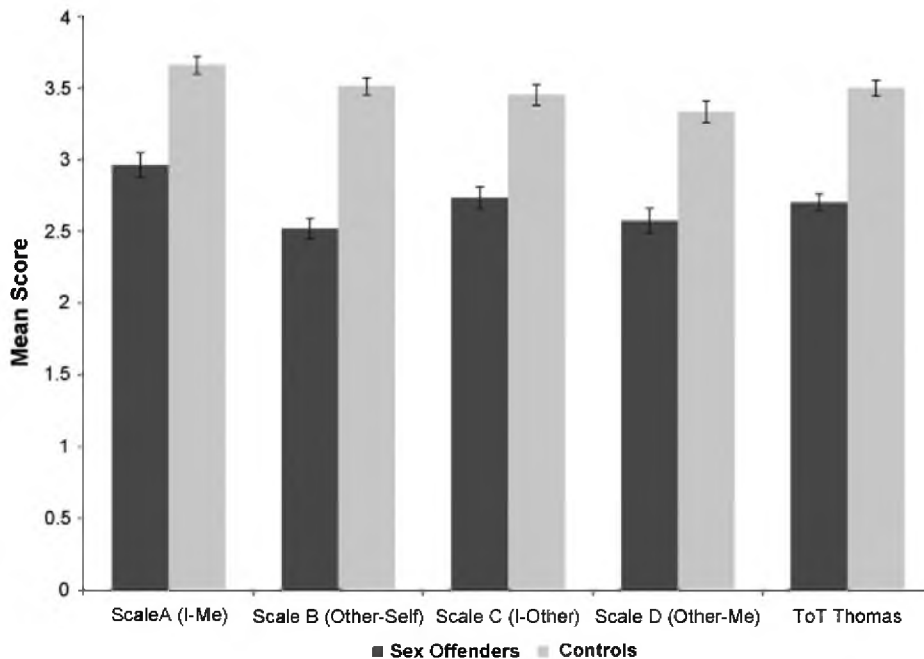

Fig. 2. Sexual offenders' vs. nonoffenders' scores on the individual scales and on the total Th.o.m.a.s., with standard error bars.

A repeated measures ANOVA was performed with a two-level between-subjects factor (*Group*: sex offenders vs. nonoffenders) 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 ($F_{(1,40)}$ = 97.15; $p < .001$); overall, sexual offenders performed worse than nonoffenders on Th.o.m.a.s. scales. In more detail, a series of *t*-tests revealed that their performance was significantly worse than controls on each individual scale type (*t-test: t* ranging from -10.75 to -6.59, $p < .001$), as illustrated in Fig. 2. Furthermore, there was evidence for a main effect of the scale type ($F_{(3,38)}$ = 13.33; $p < .001$), and the *Group X Scale type* interaction was also significant ($F_{(3,38)}$ = 5.40; $p < .01$), indicating a different pattern of performance between sex offenders and controls 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 sex offender and control groups. The test revealed that sex offenders – but not controls ($p = .16$) – performed worse on Scale B, which assesses third-person ToM, than on Scale A, which assesses first-person ToM ($p < .001$). In other words, sex offenders appeared to be in greater difficulty when reasoning about others' mental states (third-person ToM) than when doing so about their own (first-person ToM). Furthermore, the post-hoc pairwise comparison showed that sex offenders – although again not controls ($p = 1$) – performed worse on Scale B, which also assesses ToM from an allocentric perspective, than on Scale C, which assesses ToM from an egocentric perspective (both scales assess third-person ToM) ($p < .05$). That is, when sex offenders had to reason about others' mental states (third-person ToM), they found it harder to take an allocentric than an egocentric perspective (Fig. 2). Finally, in both groups, we found a significant difference between Scale A, which assesses first-order ToM, and Scale D, which assesses second-order ToM ($p < .01$). That is, it seems that it is easier for both groups to reason about first-order than second-order ToM. All the other comparisons between scales were not significant in both groups (*p* ranging from .16 to 1).

Fig. 3 shows the mean total score for both groups on the three *Th.o.m.a.s.* subscales (*Awareness, Relation* and *Realization*).

A repeated measures ANOVA was performed with a two-level between-subjects factor (*group*: sexual offenders vs. nonoffenders) and a three-level within-subjects factor (*subscale type*: Awareness, Relation, Realization). The analysis revealed a main effect of the type of group ($F_{(1,40)}$ = 92.75; $p < .001$), indicating that sex offenders obtained lower overall scores than controls; in more detail, a series of *t*-tests showed that sexual offenders performed worse than nonoffenders on each subscale (*t*-test: *t* ranging from -10.14 to -6.85, $p < .001$), as can be seen in Fig. 3. There was also a significant main effect for the dimension scale types ($F_{(2,39)}$ = 6.10; $p < .01$), indicating that that the participants' scores varied according to the subscale type involved. The *Group X Subscale type* interaction was not significant ($F_{(2,39)}$ = .34; $p = .56$), indicating that the pattern of performance among subscales did not differ between groups.

Fig. 4 shows the mean total score for the sexual offender and nonoffender groups for each *kind of* mental state scales (beliefs, desires, positive and negative emotions).

A repeated measures ANOVA was performed with a two-level between-subjects factor (*Group*: sexual offenders vs. nonoffenders) and a four-level within-subjects factor (*mental state type*: beliefs, desires, positive emotions, negative emotions). This analysis showed a main effect for the participant group ($F_{(1,40)}$ = 96.26; $p < .001$), suggesting that overall the sex offenders' performance was worse than that of the controls; in more detail, a follow-up *t*-test revealed that sexual offenders performed worse than nonoffenders on each of the four kinds of mental state (*t*-test: *t* ranging from -9.29 to -4.70, $p < .001$) (see Fig. 4). There was also a main effect for the mental state type ($F_{(3,38)}$ = 7.49; $p < .001$) and the *Group X mental state type* interaction was also significant ($F_{(3,38)}$ = 2.85; $p < .05$). In more detail, post-hoc analysis, using a Bonferroni correction for multiple comparison ($p < .05$), revealed that sex offenders – but not controls ($p = 1$) – performed worse on questions investigating belief than on questions investigating negative emotions ($p < .01$); furthermore, sex offenders, but again not controls ($p = .43$), performed worse on questions investigating positive emotions than on questions investigating negative emotions
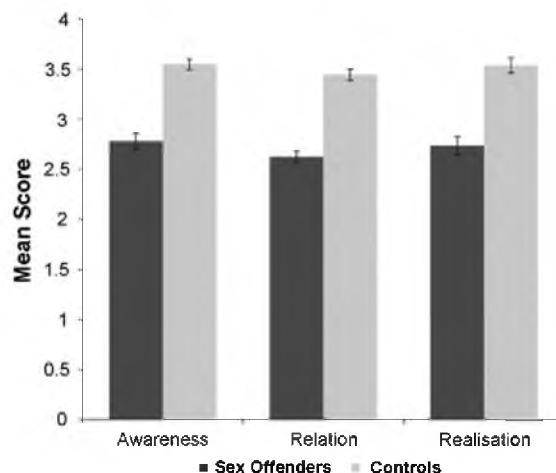

Fig. 3. Sexual offenders' vs. nonoffenders' scores on the three Th.o.m.a.s. subscales, with standard error bars.
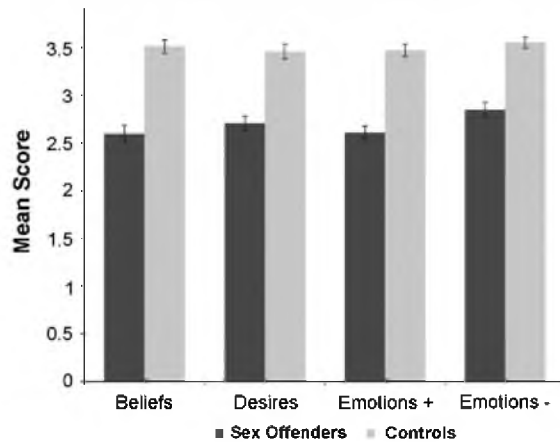
Fig. 4. Sexual offenders' vs. nonoffenders' scores on the four kind of mental states assessed by Th.o.m.a.s., with standard error bars.

Table 1
Mean and standard deviations of sex offender subgroups' scores on the classical ToM tasks, and on the Th.o.m.a.s. scales, subscales and mental states scales.

Task	Sex offenders subgroups (N = 21)		
	Child molesters extrafamilial (N = 6)	Child molesters intrafamilial (N = 8)	Rapists (N = 7)
Classical ToM tasks			
1st order ToM	1 (.0)	.94 (.18)	.93 (.19)
2nd order ToM	.95 (.20)	.69 (.26)	.64 (.24)
Strange Stories	.81 (.22)	.75 (.15)	.67 (.21)
Th.o.m.a.s.			
Total score	2.79 (.20)	2.74 (.32)	2.60 (.28)
Scale			
A (I–Me)	2.90 (.54)	3.14 (.26)	2.81 (.37)
B (Other–Self)	2.67 (.21)	2.54 (.41)	2.37 (.26)
C (I–Other)	2.87 (.29)	2.72 (.36)	2.63 (.39)
D (Other–Me)	2.72 (.43)	2.55 (.42)	2.47 (.34)
Subscale			
Awareness	2.89 (.20)	2.84 (.42)	2.61 (.34)
Relation	2.70 (.29)	2.62 (.31)	2.54 (.20)
Realization	2.80 (.32)	2.81 (.39)	2.58 (.53)
Dimension			
Beliefs	2.81 (.27)	2.65 (.44)	2.35 (.40)
Desires	2.75 (.24)	2.77 (.45)	2.60 (.30)
Emotions +	2.65 (.32)	2.66 (.27)	2.52 (.36)
Emotions −	2.90 (.39)	2.86 (.36)	2.77 (.33)

(p < .01) (see Fig. 4). All the other comparisons between mental state types were not significant in both groups (p ranging from .43 to 1).

3.1.3. Sexual offender subgroups performance on the theory of mind tasks

Table 1 shows descriptive statistics for the performance of sex offender subgroups (extrafamilial child molesters, intrafamilial child molesters and rapists) on both the classical ToM tasks and the Th.o.m.a.s. task.

We carried out further exploratory analysis to compare the overall performance on the classical ToM tasks and on the Th.o.m.a.s. task for these three subgroups. One-way ANOVA revealed no significant differences between the three subgroups either on the overall classical ToM tasks ($F_{(2,18)}$ = 2.17; p = .14) or on the overall Th.o.m.a.s. task ($F_{(2,18)}$ = 1.05; p = .37). This lack of difference could be due to the small number of participants in each subgroup.

3.2. Risk levels and theory of mind performance

Our final hypothesis concerned the possibility of a relationship between theory of mind impairments and the sex offenders' estimated risk of reoffending (as evaluated by the Risk Matrix 2000, Scale-C/Combined). In order to test this hypothesis,

Table 2
Correlations between the overall Th.o.m.a.s. score, the overall ToM tasks score, I.Q., use of alcohol and use of drug for the sex offenders' group.

	Classical ToM tasks (total)	Th.o.m.a.s. (total)
Classical ToM tasks (total)	1	.60[**]
I.Q.	.26	.20
Alcohol use	−.10	−.07
Drug use	−.17	−.25
Risk matrix total	−.60[**]	−.50[*]

[*] $p < .05$.
[**] $p < .01$.

we performed a correlation analysis between the overall recidivism risk and the overall score that sex offenders obtained both at the classical ToM tasks (mean total score: $.78 \pm .11$) and at the Th.o.m.a.s. task (mean total score: $2.70 \pm .27$) (see Table 2).

The results showed a negative relationship between scores on the Scale-C/Combined and both the overall scores on the classical ToM tasks ($r = −.60$; $p < .01$) and the total score on the Th.o.m.a.s. ($r = −.50$; $p < .05$). This means that the higher the score obtained by sex offenders on the Risk Matrix, the lower the score they obtained on the ToM tasks and Th.o.m.a.s.

3.3. Correlations within the sample of sexual offenders

Several correlations were carried out within the sample of sex offenders in order to explore possible relationships between the overall scores on the classical ToM tasks, the overall scores on Th.o.m.a.s., and clinical variables of interest (IQ, drug and alcohol abuse).

A positive correlation was found between the overall scores on the classical ToM tasks and the overall score on Th.o.m.a.s. ($r = .60$; $p < .01$).

No significant relationships were found between any of the above variables and variables that could have an impact on theory of mind abilities, e.g. IQ, alcohol and drug use (see Table 2).

4. Discussion

4.1. General and specific theory of mind abilities in sexual offenders

In the present study, a wide assessment of the mindreading ability of sexual offenders was compared with that of a matched group of nonoffenders. Our hypotheses suggested that in sexual offenders the ability to understand their own mental states and those of others may be impaired, and that there might be different degrees of this impairment across different facets of their theory of mind ability.

The performance of the sex offender and matched nonoffender groups was compared for first-order, second-order and advanced (i.e. Strange Stories) classical ToM tasks, and a ToM interview was administered, i.e. Th.o.m.a.s. We decide to adopt all these tasks to provide the most complete assessment possible of such cognitive ability in a sample in which it has hitherto been understudied.

First, it should be noted that we found a significant correlation between the overall sexual offenders' score on the classical ToM tasks (i.e. the global performance considering the first-order, the second-order and the Strange Stories tasks all together) and their overall score on Th.o.m.a.s. This suggests that these measures are all assessing correlated mindreading abilities. In addition, there were no significant relationships between any of the theory of mind tasks and clinical variables (i.e. IQ and drug/alcohol problems) among the sexual offender group, suggesting that the assessment we conducted appear to reliably measure ToM abilities without involving further intelligence requirements or without being influenced by other variables.

Starting from the classical ToM tasks, our analysis revealed that sexual offenders performed worse than nonoffenders on all of them, with the exception of first-order ToM tasks; however, the latter finding is not surprising, since the test is very simple, having been created for 3- and 4-year-old children. By contrast, sex offenders performed worse than controls on both second-order and Strange Story tasks, which require more complex reasoning about other people's minds than the first-order tasks.

Furthermore, following suggestions in Ward et al. (2000), we aimed to examine not only the possibility of a general ToM impairment among sexual offenders, but also the presence of potential specific deficits in their theory of mind components. Thus, in addition to the above mentioned classical tasks, we adopted Th.o.m.a.s., an interview comprising four scales, that allows theory of mind to be assessed from different perspectives (i.e. first- vs. third-person, and egocentric vs. allocentric). Overall, the analysis showed poorer performance on Th.o.m.a.s. for the sex offender group compared to the controls; these findings indicated that sexual offenders performed worse than nonoffenders on each of the individual scales (Scale A:

first-person theory of mind; Scale B: third-person theory of mind from an allocentric perspective; Scale C: third-person theory of mind from an egocentric perspective; Scale D: second-order ToM).

Taken together, these findings support our hypothesis that sexual offenders suffer from a deficit in their ability to understand and attribute mental states both to themselves and to others. As suggested by Keenan and Ward (2000), a deficit in theory of mind at a global level could be considered a bias or distortion in the understanding of the mental states of self and others. In the case of sexual offenders, that would be evident when, for example, the offender fails to distinguish his own beliefs or desires from those of his victim. These offenders are, as Keenan and Ward (2000) suggested, unable to understand that a woman or a child could have sexual desires quite different from their own.

Follow-up analysis revealed that the pattern of differences between groups varied across the different Th.o.m.a.s. scales; in particular, the sex offender group performed worse on Scale B (third-person ToM allocentric perspective) than on both Scale A (first-person ToM) and Scale C (third-person ToM egocentric perspective), while the control group performed equally well on all three scales. These findings support our hypothesis that sexual offenders find it easier to make first-person rather than third-person judgments about mental states, and that they are more effective in making these judgments from a self-centered (i.e. egocentric) perspective than from another person's (i.e. allocentric) perspective. These findings are also consistent with observed deficits among sexual offenders in terms of their perspective-taking and empathic abilities (Hanson & Scott, 1995; Marshall, Hudson, Jones, & Fernandez, 1995; Ward et al., 2000). Moreover, there may be a link between the predominance of an egocentric perspective and findings showing that sexual offenders manifest a variety of cognitive distortions (Mihailides et al., 2004; Polaschek & Gannon, 2004; Wood & Riggs, 2009). The present findings are also in line with the suggestion of Marshall, Fernandez, Marshall, and Serran (2006), Marshall, Marshall, Serran, and O'Brien (2008) that sexual offenders have poor self-reflective ability. Finally, we found that it was easier for both groups to reason about first-order (Scale A) than about second-order ToM (Scale D). This finding is in line with previous studies using different samples, showing that both normally developed children (Wellman & Liu, 2004) and schizophrenic participants (Mazza et al., 2001) found it easier to solve first-order rather than second-order ToM tasks.

Furthermore, sexual offenders also fared worse in comparison to the controls on each of the three subscales (awareness, relation and realization). These results indicate that sexual offenders have a general deficit involving their awareness of mental states, their ability to correlate different mental states, and their ability to determine their own actions and behavior according to their own mental states and those of others. This finding is in line with Ward and Beech's integrated theory (2008), according to which a failure of self-regulation (awareness) is linked to an inappropriate application (realization) of epistemic mental states (i.e. inaccurate beliefs and cognitive distortions) and volitional mental states (i.e. emotions).

Finally, as regards the sexual offenders' performance, the present study investigated whether they could effectively recognize, differentiate and apply different mental states (beliefs, desires, positive emotions and negative emotions). Our finding showed that they performed worse than controls on question investigating each specific mental state. In more detail, the sexual offenders' performance, but not that of the controls, was worse on questions about understanding beliefs than on those about negative emotions, and worse on questions about positive emotions than on those about negative emotions. A possible explanation of this finding is that sex offenders usually experience negative emotional states more often than positive ones, as reported in the clinical literature (e.g. in Marshall, Fernandez et al., 2006; Marshall, Marshall et al., 2006), and so they may be more able to understand this specific mental state type than the other ones.

Finally, the literature also showed that child molesters may retain some mindreading abilities that help them to groom their victims (Elsegood & Duff, 2010). Thus, for exploratory purposes, we compared ToM performance within the three sex offender subgroups (extrafamilial child molesters, intrafamilial child molesters and rapists) in order to highlight possible differences depending of the type of offence; no statistical difference emerged between groups. Looking at the descriptive data, however, there seems to be a decreasing trend in the ToM performance related to the type of offence, with the child molester group doing slightly better than the rapists. It should be noted that the small number of subjects in each subgroup could be responsible of the lack of statistical difference within subgroups and, for this reason, further research targeting this point is needed.

4.2. Recidivism risk and theory of mind

The observed impairments in the theory of mind abilities among sexual offenders were negatively related to their estimated risk of reoffending, as assessed by the Risk Matrix 2000, this means that the worse is the score on the theory of mind task, the higher the risk of reoffending. This preliminary finding suggests that theory of mind abilities may be considered as criminogenic factors additional to those already identified, or that theory of mind deficits may directly influence other criminogenic factors, such as intimacy deficits and socio-affective functioning. Theory of mind deficits are clearly modifiable (see Keenan and Ward (2000), for suggestions) and may, therefore, be construed as dynamic risk factors, i.e. an enduring risk factor linked to the likelihood of offending that can nevertheless be changed or improved following intervention (Craig, Beech, & Harkins, 2009). Nevertheless, we note that further research on a larger sample is required in order to achieve a deeper understanding of this result.

5. Conclusion

In conclusion, the novelty of our approach was to assess ToM abilities in sex offenders through a wide set of measures, ranging from the classical ToM tasks to the novel Theory of Mind Assessment Scale. The present study extends the presently

limited knowledge we have of sexual offenders' mindreading abilities, and encourages further investigations of this potentially valuable issue.

The ability to make accurate judgments about the content of people's minds is clearly a fundamentally important feature of social intelligence that underpins all aspects of social interaction (see Moses & Tahiroglu, 2010), whether these interactions involve acceptable or unacceptable behaviors. In this sense, enhancing mindreading skills should be a central feature of any programme that attempts to increase all types of socio-affective functioning. As noted by Marshall, Marshall, Serran, and O'Brien (2008), a psychological treatment for sexual offenders should not focus solely on reducing their risk of reoffending, but also on developing or rebuilding the basic social cognitive skills that are essential for a satisfactory quality of life. Empathy deficit is currently considered as a dynamic risk factor associated with reoffending risk, and it is normally addressed in sex offenders' treatment. Here, we have proposed that theory of mind may also be considered as a dynamic risk factor that affects the likelihood of an offending behavior occurring; thus, in our opinion, a specific ToM treatment strategy should be included in sex offenders' treatment plans. Currently, there are specific treatment strategies to address this problem that are used in other clinical samples within the general framework of a metacognitive-based treatment approach (see, for example, Wells, 2009) or mentalization-based treatment (see, for example, Bateman & Fonagy, 2004). As Semerari, Carcione, Dimaggio, Nicolo, and Procacci (2007) have suggested, theory of mind is one of the several subfunctions involved in metacognition, i.e. the ability to monitor, differentiate and integrate different mental states.

In summary, our findings appear promising, although further research is needed in order to obviate some of the limits of our study. Its main limitation was the small sample size, which may have influenced our data analysis, especially as regards the sex offender subgroups (i.e. child molesters, rapists and incest offenders). Future research needs to be done to explore whether the ToM deficit may be related to the type of offence and the type of victim. Moreover, another limit of our study was that we did not compare sex offenders' performance on the ToM tasks with that of nonsexual criminals, e.g. violent and nonviolent offenders. While the results indicate that sexual offenders have deficits in various ToM tasks relative to nonoffenders, the present study has not ruled out the possibility that these deficits could be common among all types of offenders. It may be that Theory of Mind deficit plays a role in criminality more generally and is not unique to sexual offenders. Nevertheless, there is no clear evidence in the literature of a correlation between deficit in ToM abilities and antisocial behavior, or criminality (e.g. see Abu-Akel & Abushua'leh, 2004; Blair, 1996, 2005; Proctor & Beail, 2007). Further research on theory of mind abilities among sexual offenders is needed, particularly studies that examine the possibility that these deficits are specific to sexual offenders rather than being characteristic of all criminals.

Acknowledgments

Appendix A. Tasks used to examine the ability to understand first- and second-order false belief

A.1. First-order false belief tasks

A.1.1. Cigarettes task (Pickup & Frith, 2001)
The original *Smarties* task was created for children (Perner, Leekam, & Wimmer, 1987) and then modified for adults by replacing Smarties with cigarettes (Pickup & Frith, 2001).

In this test the experimenter shows the subject a cigarette pack and asks: "*What is inside this?*". Usually the subject answers: "*Cigarettes*". The experimenter then opens the pack, shows that it contains pencils instead, closes it and asks: "*When the nurse enters the room, what will she think is side?*".

A.1.2. Sally – Anne task (Baron-Cohen et al., 1985)
In this test the experimenter shows a vignette depicting a doll named Sally and a doll named Anne. In the vignette the narrator says: "*Sally places her ball in her basket and then she leaves the scene. Anne transfers the ball from the basket to the box*". The narrator then asks the viewer: "*When Sally comes back, where will she think her ball is?*" (ToM question).

A.2. Second-order ToM tasks

A.2.1. The Ice-cream van story (Baron-Cohen, 1989)
The statement of the Ice-cream van story is the following: "John and Mary are together in the park. Along comes the ice-cream man. John would like to buy an ice-cream but has no money with him. The ice cream man tells John to go home and get his money while he (the ice cream man) will wait in the park. When John goes home to get the money, the ice-cream man moves to the church. Later John meets the ice-cream man in front of the church. John's companion, Mary, does not know

about the ice-cream man's move because she is still at home". The subject is asked: "Where does Mary think John has gone to buy an ice-cream?" (ToM question).

A.2.2. The Burglar story (Happé & Frith, 1994)
The *Burglar story* states: "*A burglar has just robbed a bank and is running away from the police when he meets his brother. The burglar asks his brother not to let the police know where he is, then he runs away and hides in the church yard. The police have looked everywhere for the burglar except the church yard and the park. When they come across the burglar's brother they ask him if the burglar is in the church yard or in the park. They expect him to lie and so wherever he tells them they will go and look in the other place. But the Burglar's brother who is very clever and does want to save his brother knows that the police don't trust him. The* subject is asked: "*Where will the burglar's brother tell the police to look for the burglar. In the church yard or in the park?*" (ToM question).

Appendix B. Task used to examine the ability to understand complex mental states

B.1. The Strange Stories Task (Happé, 1994)

An example story is the following: "*During the war, the Red army captured a member of the Blue army. The Red Army wants the prisoner to tell them where his army's tanks are; they knew they were either by the sea or in the mountains. They know the prisoner would not want to tell them the truth, since he would want to save his army, and so they assume he will lie to them. The prisoner is very brave and very clever. He does not want to let them find his tanks. The tanks are actually in the mountains. When the prisoner is asked where his tanks are, he tells the Red army: "They are in the mountains.*" The subject is then asked: "*Why did the prisoner say that?*" (ToM question). The subject must explain why the prisoner responded as he did.

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