

Assessing Deictic Relational Responding in Social Anxiety Using the Implicit Relational Assessment Procedure

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ABSTRACT

The current study sought to investigate perspective-taking in a group of individuals diagnosed with psychosis. The Social Anxiety Implicit Relational Assessment Procedure (SA-IRAP) contrasted statements and questions referring to 'anxious' and 'non-anxious' experiences. The SA-IRAP and a Faux-pas (Theory of Mind) test were presented to two groups of participants: a clinical group with a diagnosis of social anxiety and a group of controls. IRAP effects for each group were in the predicted direction and a ROC analysis showed that the IRAP correctly classified 77% of the individuals with social anxiety with a sensitivity level of 97% and a specificity level of 36%. The IRAP was thus successfully used to correctly classify the sample of clinical individuals. However, the study also demonstrated that the two groups were similar with regard to their level of competency on the perspective-taking IRAP. The article also discusses the relationship between the data and recent developments in RFT.

Keywords: Social anxiety, Perspective-taking, Relational Frame Theory, Implicit Relational Assessment Procedure.

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Novelty and Significance

What is already known about the topic?

- It has been argued that individuals with social anxiety have difficulties with Theory of Mind and social perspective-taking skills.
- Relational Frame Theory has provided an alternative functional-analytic approach to perspective-taking as deictic relational responding.
- The Implicit Relational Assessment Procedure can be used as a measure of relational responding.

What this paper adds?

- The Implicit Relational Assessment Procedure can be successfully used to measure deictic relational responding.
- Implicit Relational Assessment Procedure scores of those with a diagnosis of social anxiety and controls were in the predicted direction.
- The Implicit Relational Assessment Procedure successfully predicted group membership, unlike a traditional Theory of Mind test.
- Results challenge traditional 'deficit' models of perspective-taking in social anxiety.

Social anxiety disorder (SAD) involves fear and avoidance of social situations, and can be extremely distressing and debilitating (Lochner, Mogotsi, du Toit, Kaminer, Niehaus, & Stein, 2003). The Clark and Wells (1995) cognitive model of social anxiety identified several relevant processes. These include the perception of social situations as dangerous, and the subsequent focusing of attention on the self as a social object

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(instead of focusing attention outward). Other key processes include safety behaviours, anticipatory anxiety and post-event reviewing. According to Clark and Wells, these processes prevent individuals from receiving positive feedback, help maintain anxious beliefs and negative thinking, and sometimes result in deficits in social skills.

According to the Clark and Wells (1995) model, individuals with social anxiety adopt an ‘observer’ perspective (i.e., viewing themselves from the perspective of others) by constructing a largely negative image of how they appear to others (e.g., as sweating or blushing). In addition, they assume that this is the way others actually see them. In support of the model, several studies have shown that individuals with social anxiety adopt an observer perspective more often than non-diagnosed persons (Hackmann, Surawy, & Clark, 1998; Wells, Clark, & Ahmad, 1998). Spurr and Stopa (2003) also reported that adopting an observer perspective is associated with more frequent negative thoughts, more safety behavior, and more negative self-evaluations. It is not surprising, therefore, that treatment of social anxiety based on cognitive-behavioral therapy includes training in: task-concentration; directing attention away from anxiety symptoms; and assertiveness in social situations (Hoffman & Otto, 2018).

Perspective-taking skills are central to social cognition, and enable us to distinguish between the mental states of self and others (Garfield, Peterson, & Perry, 2002). Indeed, some regard perspective-taking as a prerequisite for complex social interactions that require empathy, irony, humor, or deception (Barnes-Holmes, 2001; Heagle & Rehfeldt, 2006). Given this pivotal role of perspective-taking in social cognition, individuals with difficulties in the former are likely to experience problems in the latter (Brüne & Brüne-Cohrs, 2006; Couture *et alia*, 2006). In support of this assumption, Hezel and McNally (2014) reported superior Theory of Mind (ToM) performances in a control group relative to participants with SAD. Specifically, the latter showed greater misunderstanding of social situations by attributing more intense emotions and greater meaning to what others were thinking, feeling, and intending (see also Washburn & Bromiley, 2012).

Perspective-taking as deictic relational responding has been a strong focus in the last two decades in behavioral psychology, particularly by researchers studying relational frame theory (RFT, McHugh, Barnes-Holmes, & Barnes-Holmes, 2004; Barnes-Holmes, McHugh, & Barnes-Holmes, 2004). In the development of the first protocol to study these relational repertoires and their various components, Barnes-Holmes (2001) conceptualized perspective-taking as responding in accordance with the deictic relations of I-You, Here-There, and Now-Then. While there have been numerous studies using the protocol with typical samples (see Montoya, Molina, & McHugh, 2017, for a review), there have been only a few studies that have presented deictic relations tasks to clinical samples, and indeed only four that have examined performances of individuals with a diagnosis relevant to social anxiety.

Villatte *et alia* (2008) presented the Barnes-Holmes protocol to a group of individuals with social anhedonia, compared with controls. The findings showed superior performances by the control group, particularly on reversed I-you and reversed here-there relations (i.e., demanding a shift in perspective-taking assessed, for example, by the statement “If I was you and you were me”). Vilardaga, Estévez, Levin, and Hayes (2012) presented a modified version of the protocol to college students with social anhedonia, and found evidence of a relationship among performances on the protocol and social anhedonia, empathy, and experiential avoidance. Janssen *et alia* (2014) presented a modified version of the protocol to a group of individuals with SAD, compared with controls. Their findings showed superiority (albeit non-significant) in the performances of the control group on all trial-types, with significant differences recorded on the reversed trials. Hendriks *et alia* (2016) compared the performances of individuals with an anxiety disorder, with a sample with psychosis and a sample of controls. The results

showed that the group with anxiety produced weaker performances than controls on all reversed trials. Taken together, these studies show at least some evidence of weaker performances by samples of individuals with anxiety on the deictic relations protocol relative to controls.

Several authors have noted concerns with the use of the Barnes-Holmes protocol, developed essentially as a developmental tool, for work that compares clinical samples with typical adults (Hussey *et alia*, 2014; Kavanagh, Barnes-Holmes, Barnes-Holmes, McEnteggart, & Finn, 2018). The primary concern here centers around the fact that RFT, the theory on which the protocol was based, does not assume that clinical groups will show relational deficits compared to controls. Furthermore, Hussey *et alia* argued that potential differences are even less likely to emerge on trials that have not been modified in any way to match areas of difficulty typically attributed to clinical samples. In other words, if experimental trials do not target anxiety specifically, individuals with anxiety may not differ from control participants. Researchers working within RFT have attempted to address this methodological limitation by using the Implicit Relational Assessment Procedure (IRAP) to present specific and more nuanced relational trials that may be more relevant to clinical samples, and thus may be more attuned to potential differences between these and other groups (Barbero, López, Luciano, & Eisenbeck, 2016; Kavanagh *et alia*, 2018). However, there have been no published studies in which the IRAP has been used to potentially differentiate individuals with social anxiety and controls. This was the focus of the current research.

To examine deictic relational responding in individuals with a diagnosis of social anxiety, we adapted the I-YOU trials from the Barnes-Holmes protocol to present anxiety-based statements typically reported by this group. Although what we employed here was a lengthy and complex IRAP (relative to the IRAP format typically used, see Kavanagh *et alia*, 2018), the main aim was to present statements that contrasted a socially-anxious experience (e.g., “I think people are negative about me”) with a non-socially anxious experience (e.g., “I think people are positive about me”), as well as contrasting simple deictic relations with reversed relations.

We hypothesized that the clinical group with social anxiety would respond differentially to the anxiety-based trials, relative to a group of controls. That is, we expected that the D-scores produced by the two groups would differ significantly on all four trial-types. We also presented all participants with the Faux-pas test as a ToM measure, in order to assess the relative predictive validity of the SA-IRAP with a more traditional measure (We also presented all participants with the National Adult Reading Test (NART) in order to ensure that there were no differences in IQ capabilities across the two groups. Indeed, no differences were observed. In order to ensure the integrity of the control group, they also received the General Health Questionnaire (GHQ) as a screen for the presence of minor psychiatric diagnoses. None of those who participated in the control group indicated any such pattern on the GHQ). Whilst our results were in line with what one might intuitively expect, there were aspects of the data that pertain to recent conceptual developments in RFT and in understanding the IRAP as a measure of relational responding. Because these specific findings were not the main aim of the current research, we leave reference to them to the Discussion.

METHOD

Participants

Thirty-nine participants (24 females) who had a diagnosis of anxiety were recruited for the study. While the type of anxiety disorder varied across participants, most had

been categorized as socially anxious. Some participants had also received comorbid diagnoses. The age range of this clinical group was 20 to 64 years, with a mean age of 34.1 years. Thirty-six of these participants reached the performance criteria on the SA-IRAP (see below). For confidentiality reasons, no additional participant information is provided for this group.

Thirty-nine undergraduate participants (21 females) were recruited as controls, from the university participant pool at X University. The age range of the control group was 19 to 29 years, with a mean age of 21.6 years. Of these, none reported any previous contact with mental health services. All 39 control participants reached the performance criteria on the SA-IRAP. All procedures in the current study were in accordance with the ethical standards of the institutional research committee, and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants.

Materials

Social Anxiety Implicit Relational Assessment Procedure (SA-IRAP). The trials employed in the SA-IRAP were based on the I-YOU trials from the Barnes-Holmes protocol, but were modified to refer specifically to social anxiety (see Appendix 1 for the full list of trials). The content that was inserted into the SA-IRAP trials was created by a team of psychologists who worked directly with the clinical sample involved in the current study. The main aim in creating the content of the trials was to capture at least some of the key topographical features of social anxiety. Consider, for example, the trial “I think other people are negative about me.” This trial attempted to capture the fact that many of the clinical participants struggled with the perception that others think negatively about them. The SA-IRAP was also created to target responding to deictic relations as perspective-taking. Combining this focus on deictic relations with social anxiety-based content generated four trial-types, denoted as: “I think anxiously, but you don’t. What do I think?”; “I think normally, but you don’t. What do I think?”; “I think anxiously, but you don’t. What do you think?”; and “I think normally, but you don’t. What do you think?” The format of the four trial-types highlights four key features of the SA-IRAP. 1. All trials involved a full statement in a Natural Language format (for more information on Natural Language IRAPs, see Kavanagh, Hussey, McEnteggart, Barnes-Holmes, & Barnes-Holmes, 2017). 2. All statements juxtaposed what I (the participant) think versus what the participant thinks others think. 3. Half of the trial-types assessed what I (the participant) thinks, while the other half assessed what you (others) think. 4. Two of the trial-types coordinated I (the participant) with anxiety (I= anxious) and coordinated you with non-anxiety (you= non-anxious), while the other two trial-types coordinated I with non-anxiety (I= non-anxious) and you with anxiety (you= anxious).

Each trial also contained a statement that specified the perspective on which correct responding should be based *during that block of trials*. Specifically, one block of trials (referred to as the consistent block) contained the statement “If I am me and you are you”, thus denoting that responding on the basis of simple deictic relations was required (i.e., “I am responding from my own perspective and you are responding from your perspective”). In contrast, the other block of trials (i.e., inconsistent) contained the statement “If I was you and you were me”, thus denoting that responding on the basis of reversed deictic relations was required (i.e., “I am responding from your perspective and you are responding from my perspective”).

In order for the two alternative perspectives to control responding on each trial, the perspective statement was embedded into the trial between the trial statement and the question that followed. Consider the simple perspective-taking trial, “I care what other people think of me, but you are carefree about what other people think of you. *If I am me and you are you*. What is my reaction to what other people think of me?” Now consider the reversed perspective-taking trial, “I think it’s fine when other people see my insecurity, but it troubles you when other people see your insecurity. *If I was*

you and you were me. How do you feel when other people see your insecurity?” At this point, the reader is strongly encouraged to examine Figure 1, in which an example of each of the four trial-types from a block of simple deictic relations is presented. Consider Trial-type 1 on the top-left of Figure 1. The I= anxious part of the statement “I think other people are negative about me” is followed by the you= non-anxious part “but you think other people are positive about you.” This statement is then followed by the perspective-taking statement “If I am me and you are you”, which indicates that simple perspective-taking is required. This is then followed by the trial question “What do I think other people are?”, in response to which simple perspective-taking was correct. The two response options on this trial were Negative and Positive. Given that this was a trial in a simple perspective-taking block, and that the trial statement specified I= anxious and you= non-anxious, the correct response involved selecting Negative (“I think other people are negative about me”). Consider Trial-type 2 on the top-right of Figure 1. The I= non-anxious part of the statement “I think other people are positive about me” is followed by the you= anxious part “but you think other people are negative about you.” Again, this is followed by “If I am me and you are you”, indicating that simple perspective-taking is required. This is again followed by the question “What do I think other people are?”, in response to which simple perspective-taking was again correct. Given that the trial statement now specified I= non-anxious and you= anxious, the correct response involved selecting Positive (I think other people are positive about me). Consider Trial-type 3 on the bottom-left of Figure 1. The I= anxious part of the statement “I think other people are negative about me” is followed by the you= non-anxious part “but you think other people are positive about you.” Again, this is followed by “If I am me and you are you”, indicating that simple perspective-taking is required in responding to the question “What do you think other people are?” Given that the trial statement now specified I= anxious and you= non-anxious, the correct response involved selecting Positive (you think other people are positive about you). Finally, consider Trial-type 4 on the bottom-right of Figure 1. The I= non-anxious part of the statement “I think other people are positive about me” is followed by the you= anxious part “but you think other people are negative about you.” Again, this is followed by “If I am me and you are you”, indicating that simple perspective-taking is required to respond to the question “What do you think other people are?” Given that the trial statement now specified I= non-anxious and you= anxious, the correct response involved selecting Negative (you think other people are negative about you).

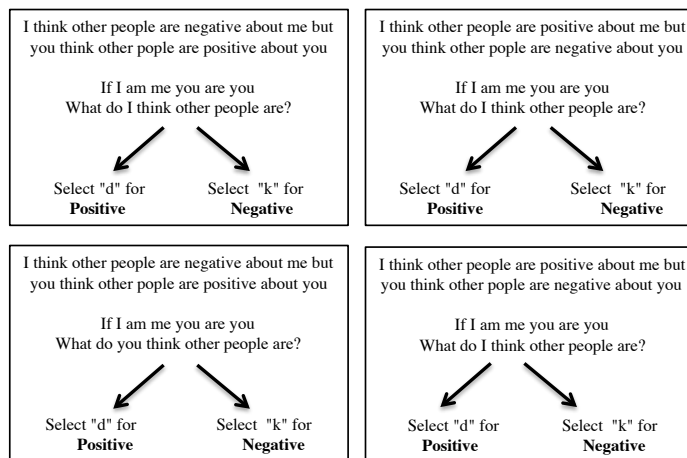


Figure 1. Schematic illustration of the four trial-types on consistent blocks. Arrows and boxes with text did not appear on-screen. Trial-types appear from left to right as: (1) “I think anxiously, but you don’t / What do I think”; (2) “I think normally, but you don’t / What do I think”; (3) “I think anxiously, but you don’t / What do you think”; (4) “I think normally, but you don’t / What do you think”.

The Faux-pas test (Baron-Cohen, O’Riordan, Stone, Jones, & Plaisted, 1999). Is a ToM-based measure of perspective-taking that targets the recognition and understanding of faux-pas situations. A *faux-pas* situation occurs, for example, when a character in a story unintentionally says something awkward or unfriendly to another. For instance, consider a situation in which you make a dismissive comment about lawyers to your colleague and only afterwards you realize that the wife of that colleague is a lawyer. Each story ends with a generic question such as “Did anyone say anything awkward?” If participants respond with *Yes*, then a series of additional questions follow, but not if participants respond with *No*. The Faux-pas test comprises 20 short stories, although only nine were employed currently in order to avoid fatigue in the clinical sample (Spek, Scholte, & Van Berckelaer-Onnes, 2010). All stories were read aloud by the Researcher, but participants were also provided with a printed copy of the nine stories in order to minimize the cognitive load, especially for clinical participants. After each question, participants were asked whether a faux-pas had occurred in the story and were asked about the underlying motive (Spek *et alia*, 2010). Five of the nine stories contained a *faux-pas* situation, while four control stories did not. The percentage of correct answers was calculated for each participant.

Procedure

The study was approved by the relevant institutional review boards. Prior to commencing, participants were informed about the broad aims of the research and were advised that they were free to discontinue participation at any time. Confidentiality and anonymity were assured during the process of obtaining informed consent. Participation was complete in a single session, which lasted approx. 1 hour for control participants and 1-2 hours for clinical participants. All participation was conducted on an individual basis in an experimental room at a relevant location. For each participant, the Faux-pas test was administered first, followed by the SA-IRAP, with a short break in between.

SA-IRAP. Prior to the presentation of the test blocks, practice blocks were presented. On the first practice block, participants were verbally instructed on how to complete the procedure. That is, they were advised that each trial would present a statement at the top of the screen, with another statement in the center, and that their task was to respond as appropriate by selecting one of the two response options. Participants were informed that the pattern of responding would switch to an opposite pattern across each block (i.e., between consistent and inconsistent). These instructions also highlighted the criterion for accurate (i.e., >80%) and fast (i.e., <15,000 ms.) responding. It is important to emphasize that the response latency criterion of 15,000 ms adopted here differed from a typical IRAP in which a response latency of 2,000 ms is commonly employed. However, pilot testing in both groups indicated that the length and complexity of the label and target statements dramatically increased the time needed to respond meaningfully. Participants were also instructed that I referred only to them as follows: “The program will present statements on the screen which refer to you. Please remember that when you see “I” or “me” on-screen, this refers to you (the participant)”.

Each block comprised 40 trials, with each of the four trial-types presented 10 times within each block. Participants selected a response by pressing *D* (for the left option) or *K* (for the right). If a participant emitted a correct response, the screen cleared, and the next trial appeared. If a participant responded incorrectly, a red X appeared until a correct response was emitted. The feedback contingencies for the IRAP alternated across blocks from simple to reversed I-you relations, as above. Hence, correct responding involved switching between each pattern from block to block. The simple trials block was always presented first.

There was a minimum of one pair of practice blocks. If participants failed to achieve both accuracy and latency criteria across a pair of practice blocks, they received

automated feedback, and practice blocks continued to a maximum of four pairs of blocks. Failing to meet the criteria after four pairs of practice blocks terminated participation and these data were discarded. When the criteria were reached on a pair of practice blocks, participants proceeded automatically to one pair of test blocks. It is important to emphasize that the presentation of only one pair of test blocks differed from a typical IRAP in which three pairs of test blocks are commonly presented. No performance criteria were employed for participants to progress through test blocks, but performance feedback was presented at the end of each block to encourage participants to maintain the criteria. The program automatically recorded response accuracy (based on the first response emitted on each trial) and response latency (time in milliseconds between trial onset and emission of correct response) on each trial. Once participants finished the IRAP, they were debriefed and thanked for their participation.

RESULTS

The primary data used for the SA-IRAP were response latencies, defined as the time in milliseconds elapsing between the onset of a trial and a correct response emitted by a participant. Data from participants displaying $>15,000$ ms. response latencies and $<75\%$ accuracy on the test blocks were excluded from the analyses. For each of the remaining participants, response latencies of both the simple and reversed blocks were transformed into *DIRAP*-scores, using an adaptation of the *D*-algorithm (see Barnes-Holmes, Barnes-Holmes, Stewart, & Boles, 2010). The *D*-algorithm controls for differences in age, *IQ*, experience, and response latencies. For each of the two groups of participants, four *DIRAP*-scores were calculated, one for each trial-type: (1) "I think anxiously, but you don't. What do I think?"; (2) "I think normally, but you don't. What do I think?"; (3) "I think anxiously, but you don't. What do you think?"; (4) "I think normally, but you don't. What do you think?" A positive *DIRAP*-score reflects a bias toward the simple relations (i.e., "If I am me and you and you"), in this case, a bias toward the perspective "I think anxiously, you think normally". A negative *DIRAP*-score reflects a bias toward the reversed relations (i.e., "If I were you and you were me"), in this case, a bias toward the perspective "I think normally, you think anxiously."

The *DIRAP*-scores for the clinical and control groups are presented in Figure 2. Overall, for the clinical group, responding on all four trial-types indicated a bias toward 'I think anxiously, you think normally'. In contrast, for the control group, responding on all four trial-types indicated a bias toward 'I think normally, you think anxiously.'

A one-way ANOVA on the overall *D*-score (i.e., four *DIRAP*-scores averaged; $SA(D) = .378$ ($SE = .181$), $Control(D) = -.19$ ($SE = .209$)) with group as the between group variable proved significant ($F = 13.648$, $p < .001$). A repeated measures ANOVA was also conducted with group as the between variable and trial-type as the within variable. There was a main effect for trial-type ($df = 3$, $F = 12.199$, $p < .001$, $\mu^2 = .143$) and for group ($df = 1$, $F = 12.191$, $p < .001$, $\mu^2 = .143$), as well as an interaction effect ($df = 3$, $F = 4.084$, $p < .01$, $\mu^2 = .053$). Post-hoc comparisons, in the form of four independent t-tests, indicated significant differences between the groups on three of the four trial-types: "I think anxiously, but you don't. What do I think?" [$t(73) = 4.297$, $p < .001$]; "I think normally, but you don't. What do I think?" [$t(73) = 2.269$, $p < .05$]; and "I think anxiously, but you don't. What do you think?" [$t(73) = 3.314$, $p < .001$].

On the Faux-pas test, the clinical group showed superiority in accuracy ($M = 85.16$, $SD = 12.63$) over the control group ($M = 69.74$, $SD = 26.70$). A one-way ANOVA was also conducted with group as the between variable and Faux-pas score as the within variable, and a significant effect for group emerged ($df = 1$, $F = 7.776$, $p < .01$, $\mu^2 = .143$).

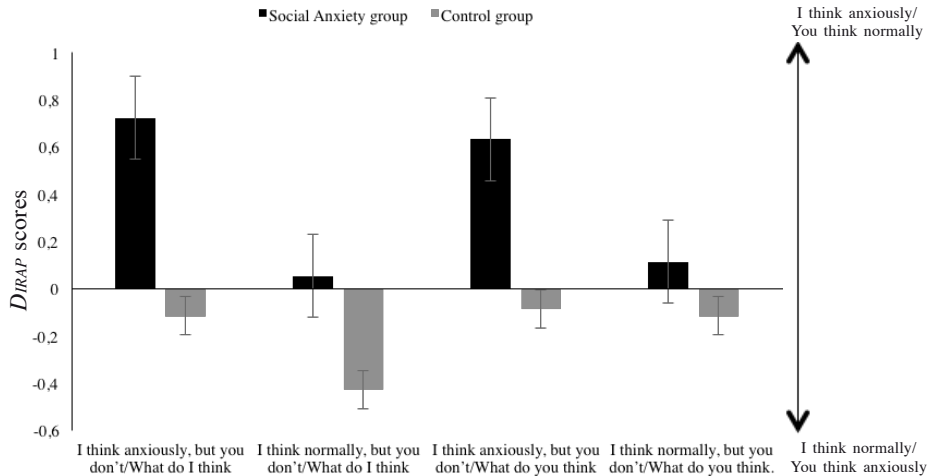


Figure 2. DIRAP-scores for the four trial-types for the two groups. Trial-types are denoted as: “(1) I think anxiously, but you don’t/What do I think; (2) I think normally, but you don’t/What do I think; (3) I think anxiously, but you don’t/What do you think; (4) I think normally, but you don’t/What do you think”. A positive DIRAP-scores reflects a bias toward the perspective “I think anxiously/You think normally”, and a negative DIRAP-scores reflects a bias toward the perspective “I think normally/You think anxiously”.

One of the aims of the current research was to determine if the SA-IRAP could be used to differentiate between the clinical group and the control group. To investigate this, we conducted a Receiver Operator Characteristic (ROC). A ROC is a graph in which the probability of a true positive, or a “hit” (i.e., sensitivity) is plotted against the probability of a false positive or a “false alarm” (i.e., specificity, see Fawcett, 2006). From this, the area under the curve (*AUC*) can be calculated, which essentially is the statistical likelihood that a randomly chosen member of the ‘positive’ group (in this case, the clinical group) will have a higher score than a randomly chosen member of the ‘negative group (in this case, the control group). Therefore, a test with perfect ability to predict group membership would have an *AUC* of 100%, and a test with no ability to detect group membership would have an *AUC* of ~50%.

The ROC analysis for the overall *D*-score proved to be a good predictor of social anxiety, with an *AUC* = 0.73 (*SE* = .059, *p* < .001). Subsequently, four ROC analyses were performed on each of the four DIRAP-scores for each trial-type and each of these was significant: “I think anxiously, but you don’t. What do I think?” (*AUC* = .770, *SE* = .055, *p* < .0001); “I think normally, but you don’t. What do I think?” (*AUC* = .647, *SE* = .064, *p* < .05); “I think anxiously, but you don’t. What do you think?” (*AUC* = .712, *SE* = .060, *p* < .01); and “I think normally, but you don’t. What do you think?” (*AUC* = .585, *SE* = .067, *p* = .2). Thus, the “I think anxiously, but you don’t. What do I think?” trial-type produced the greatest *AUC* of 77% (see Figure 3), and a cut-off for this trial-type of 0.565 yields a sensitivity level of 97% and a specificity level of 36%. A ROC analysis of the Faux-pas test was also conducted, and this was significant (*AUC* = 0.651, *SE* = .067, *p* < .05), however, an *AUC* of under 70% is considered weak.

DISCUSSION

The current study was the first to employ an IRAP (in this case the SA-IRAP) to explore deictic relational responding with a sample of individuals diagnosed with social anxiety. The SA-IRAP we used appears to have effectively targeted deictic relations and differentiated between a control group and a modestly-sized clinical sample with

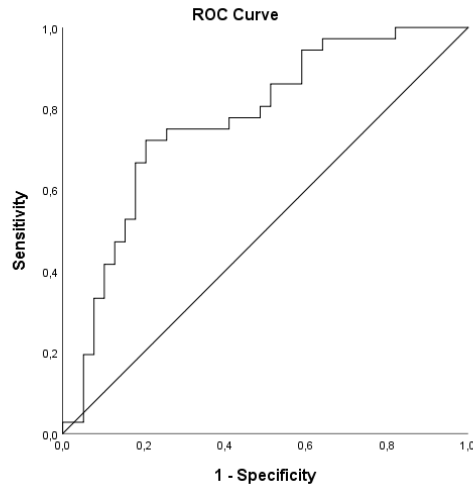


Figure 3. ROC curve for the *DIRAP* score for the “I think anxiously, but you don’t/What do you think” trial-type.

social anxiety. Specifically, the clinical group differed from controls on three of the four trial-types, and the ROC analysis indicated that two trial-types (i.e., “I think anxiously, but you don’t. What do I think?” and “I think anxiously, but you don’t. What do you think?”), as well as the overall *D*-score, were particularly successful (i.e., AUC was over 70%) in discriminating between the two groups.

In trying to account for the stark differences in the IRAP effects between the two groups, and hence the strong ability to correctly classify between the groups in the ROC analysis, we were drawn to recent conceptual developments in RFT, namely the multi-dimensional, multi-level (MDML) framework (Barnes-Holmes, Finn, McEnteggart, & Barnes-Holmes, 2018). Specifically, the relatively large effects for the clinical group on the two “I think anxiously, but you don’t” trial-types could be seen as reflecting high levels of relational coherence, low levels of derivation, and low levels of flexibility for that group. This can also be referred to as the single trial-type dominance effect (STTDE) as described in Finn, Barnes-Holmes & McEnteggart (2018). More informally, this group likely had extended histories of deictic relational responding in which the self was consistently related to socially anxious thinking. Thus, these trial-types were seen as high in truth value, reflecting highly-practiced patterns of verbal responding, and were generally resistant to counterfactual reasoning.

A related issue is that the MDML framework identifies relational complexity as an important dimension when analyzing the dynamics of relational responding. In this context, the SA-IRAP employed stimuli that were highly complex compared to typical IRAP studies, and thus an extended response latency window was applied to the measure. It seems likely, therefore, that the current relational responding reflected relatively high levels of relational complexity at the higher levels of the MDML framework (e.g., relating relational networks). Indeed, the current research demonstrates that the IRAP may be used with a clinical sample of in-patients, even when the stimuli are highly complex in nature. It remains the case, however, that doing so requires careful consideration (see McEnteggart *et alia*, 2017).

At this point, it seems important to consider the broader implications of the current findings for perspective-taking in individuals with a diagnosis of social anxiety. We have previously suggested that it may be overly simplistic to conclude that such individuals

have deficits in perspective-taking. Instead, in appealing to the MDML framework, we might propose that levels of relational coherence (i.e., truth value), derivation (i.e., practice in categorizing self with socially anxious thinking), and flexibility (i.e., ability to consider an opposing view of self) differ between individuals with and without a diagnosis of social anxiety. These differences also appear to occur at relatively high levels of relational complexity. Of course, it is possible that future research may show that these also occur at lower levels of complexity using trials that are simpler in structure (e.g., I care what other people think-True/False).

In terms of therapeutic interventions, we can also begin to formulate social anxiety in terms of the MDML framework in the same manner as above. For instance, it might be useful to target the inflexible and highly coherent patterns of thinking with regard to self. For example, a client in therapy might be encouraged to notice how their behavior is dictated by this sense of who they are (i.e., I am socially anxious therefore I cannot stand out in front of people), rather than choosing how they wish to behave in a given context (i.e., even though I am frightened of what people think, I can still do X). Specifically, a pattern of thinking, such as “I care what other people think of me” may be validated, but also elaborated along the lines of “... And, I can still choose to foster relationships with people who I care for”, in order to increase flexibility in this pattern of thinking. Using this framework, there is less focus on potential deficits and more focus on influencing the existing ways of thinking that limit clients’ lives.

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APPENDIX

Stimuli used for the psychosis-based protocol on each of the four trial-types. Response options were bespoke to the focus of the questions (e.g., “safe” and “dangerous”). On consistent blocks, the text, “If I am me and you are you” was presented before the target, whereas “If I were you and you were me” was presented on inconsistent blocks.

Trial-type 1

My perspective on me-anxious/you non-anxious

I care what other people think of me but you are carefree about what other people think of you.
What’s my reaction to what other people think of me?

I care what other people think of me but you don’t care what other people think of you.
What’s my reaction to what other people think of me?

I think other people are watching me but you think other people are ignoring you.
What do I think other people are doing?

I think other people are watching me but you don’t think other people are watching you.
What do I think other people are doing?

I think other people are negative about me but you think other people are positive about you.
What do I think other people are about me?

I think other people are negative about me but you don’t think other people are negative about you.
What do I think other people are about me?

It troubles me when other people see my insecurity but you think it’s fine when other people see your insecurity.
How do I feel when other people see my insecurity?

It troubles me when other people see my insecurity but it doesn’t trouble you when other people see your insecurity.
How do I feel when other people see my insecurity?

Trial-type 2

My perspective on me non-anxious/you anxious

I am carefree about what other people think of me but you care what other people think of you.
What’s my reaction to what other people think of me?

I am carefree about what other people think of me but you are not carefree about what other people think of you.
What’s my reaction to what other people think of me?

I think other people are ignoring me but you think other people are watching you.
What do I think other people are doing?

I think other people are ignoring me but you don’t think other people are ignoring you.
What do I think other people are doing?

I think other people are positive about me but you think other people are negative about you.
What do I think other people are about me?

I think other people are positive about me but you don’t think other people are positive about you.
What do I think other people are about me?

I think it’s fine when other people see my insecurity but it troubles you when other people see your insecurity.
How do I feel when other people see my insecurity?

I think it’s fine when other people see my insecurity but you don’t think it’s fine when other people see your insecurity.
How do I feel when other people see my insecurity?

Trial-type 3
Your perspective on me-anxious/you non-anxious

I care what other people think of me but you are carefree about what other people think of you.
What's your reaction to what people think of you?

I care what other people think of me but you don't care what other people think of you.
What's your reaction to what people think of you?

I think other people are watching me but you think other people are ignoring you.
What do you think other people are doing?

I think other people are watching me but you don't think other people are watching you.
What do you think other people are doing?

I think other people are negative about me but you think other people are positive about you.
What do you think other people are about you?

I think other people are negative about me but you don't think other people are negative about you.
What do you think other people are about you?

It troubles me when other people see my insecurity but you think it's fine when other people see your insecurity.
How do you feel when other people see your insecurity?

It troubles me when other people see my insecurity but it doesn't trouble you when other people see your insecurity.
How do you feel when other people see your insecurity?

Trial-type 4
Your perspective on me non-anxious/you anxious

I am carefree about what other people think of me but you care what other people think of you.
What's your reaction to what people think of you?

I am carefree about what other people think of me but you are not carefree about what other people think of you.
What's your reaction to what people think of you?

I think other people are ignoring me but you think other people are watching you.
What do you think other people are doing?

I think other people are ignoring me but you don't think other people are ignoring you.
What do you think other people are doing?

I think other people are positive about me but you think other people are negative about you.
What do you think other people are about you?

I think other people are positive about me but you don't think other people are positive about you.
What do you think other people are about you?

I think it's fine when other people see my insecurity but it troubles you when other people see your insecurity.
How do you feel when other people see your insecurity?

I think it's fine when other people see my insecurity but you don't think it's fine when other people see your insecurity.
How do you feel when other people see your insecurity?