

**DEICTIC RELATIONAL RESPONDING, EMPATHY,
AND EXPERIENTIAL AVOIDANCE AS PREDICTORS OF
SOCIAL ANHEDONIA: FURTHER CONTRIBUTIONS
FROM RELATIONAL FRAME THEORY**

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Social anhedonia has been linked to the development and exacerbation of psychosis. The present study explored the hypothesis that scores in social anhedonia are related to deictic relational responding, empathic concern, and experiential avoidance, as suggested by relational frame theory and acceptance and commitment therapy. College students (N = 110) from a Spanish university completed self-report measures of social anhedonia, empathy, and experiential avoidance. Deictic relational responding was measured by performance on a behavioral task. Sequential multiple regression indicated that deictic relational responding, empathy, and experiential avoidance have a large relationship size with social anhedonia, accounting for 26% of the total variance, and minimal overlap among each other. These data support the utility of these processes as predictors of social anhedonia, suggesting new psychological targets for its prevention and treatment. The implication of these processes for the development of psychosis should be explored.

Key words: social anhedonia, deictic relational responding, experiential avoidance, empathic concern, psychosis proneness, college students

Anhedonia refers to individuals' lack of interest in pleasant activities or withdrawal from them. This concept, proposed originally by Ribot (1897) and further developed by Kraepelin (1919) and Bleuler (1950), has long been argued to be a central and etiologically important feature of schizophrenia. Nomothetic measures (e.g., Chapman, Chapman, & Raulin, 1976) have led to longitudinal studies that provide support for this view, including the finding that individuals with high scores on the Magical Ideation and Social Anhedonia Scales had higher rates of clinical psychosis (21%) at a 10-year follow-up (Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994).

Chapman et al. (1994) also found that social anhedonia was more strongly related to psychosis than was physical anhedonia. Subsequent studies confirmed this finding (Kwapil, Miller, Zinser, Chapman, & Chapman, 1997), showing that the Social Anhedonia Scale alone could detect individuals at risk for the development of psychosis (this has been recently replicated in Gooding, Tallent, & Matts, 2005).

Among nonclinical samples, social anhedonia seems to be related to some important features that are also present in psychotic disorders. For example, social anhedonia correlates with poor social adjustment (Kwapil, 1998; Mishlove & Chapman, 1985), fewer friends, and lower rates of dating and marriage (Kwapil, 1998). High levels of social anhedonia also correlate with problems in working memory (Gooding & Tallent, 2003) and sustained attention (Kwapil & Diaz, 2000). Among individuals diagnosed with schizophrenia, social anhedonia is elevated and predicts poor social functioning (Blanchard, Mueser, & Bellack, 1998; Katsanis, Iacono, Beiser, & Lacey, 1992).

Substantial progress has been made in recent decades in understanding the nature, importance, and etiological role of social anhedonia, but additional research is needed to explain how to remediate this behavioral pattern and how to link it to specific interventions. Villatte, Monestès, McHugh, Freixa i Baqué, and Loas (2010a, 2010b) recently reported two studies in which they tested a relational frame theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001) account of belief attribution in individuals with high scores of social anhedonia and in another group of individuals diagnosed with schizophrenia. An RFT approach, they argued, provides a more fined-grained analysis of perspective taking and belief attribution and specifies key targets for the remediation of deficits in individuals with high social anhedonia. The studies concluded that both groups of individuals had deficits in a behavioral ability called *deictic relational responding*. The present study expands on this line of research (Villatte, Monestès, McHugh, Freixa i Baqué, & Loas, 2008, 2010a, 2010b) with the addition of two new psychological processes that might be of relevance for this phenomenon and a new procedure to evaluate deictic relational responding.

Relational frames are learned patterns of derived relational responding that have three distinct properties: mutual entailment, combinatorial entailment, and transformation of stimulus functions (Hayes et al., 2001). Some derived relational responses can be modeled by responses to physical relationships. For example, learning to respond to the comparative size of objects is known to help children later learn to respond comparatively under the control of arbitrary cues (Berens & Hayes, 2007), as when a child eventually learns that a nickel is smaller than a dime, even though it is physically larger in American coinage. Deictic relations are not of this type. Examples include I-you, here-there, and now-then (Y. Barnes-Holmes, Hayes, Barnes-Holmes, & Roche, 2001). Such relations are learned by demonstration relative to a specified perspective, such as that of the speaker. That property makes these relations difficult to learn. For example, “there” becomes “here” when it is approached, a source of considerable confusion for young children. Deictic relations develop throughout early to middle childhood and are generally, but not universally, well established in normal functioning adults (McHugh, Barnes-Holmes, & Barnes-Holmes, 2004).

There is some evidence that deictic relations are shaped and maintained by multiple exemplar training. In the natural verbal environment, this might happen through questions such as “What are you doing?” and “Where were you yesterday?” but formal presentations of well-crafted multiple exemplars are known to establish these skills in the laboratory as well (Weil, Hayes, & Capurro, 2011).

RFT theorists have argued that deictic relations are the verbal foundation for being aware of one’s own perspective and that of others (e.g., D. Barnes-Holmes, Stewart, Dymond, & Roche, 2000), providing a possible basis for what is known as *theory of mind* (Baron-Cohen, Leslie, & Frith, 2007; Premack & Woodruff, 1978). There is limited

evidence that training in deictic relations can improve theory-of-mind skills (Weil et al., 2011) and more extensive evidence that deictic frames correlate with such skills (e.g., McHugh, Barnes-Holmes, Barnes-Holmes, & Stewart, 2006; McHugh, Barnes-Holmes, Barnes-Holmes, Stewart, & Dymond, 2007; McHugh, Barnes-Holmes, Barnes-Holmes, Whelan, & Stewart, 2007).

Relational frame researchers have developed precise behavioral measurement of deictic performances. For example, children might be asked such questions as “I have a cup and you have a book; if I were you and you were me, what would you have?” This allows only one correct response and provides an objective measurement of perspective taking.

Such measures can be easily implemented in a computerized form (e.g., Rehfeldt, Dillen, Ziomek, & Kowalchuk, 2007), further increasing their replicability. One possible limitation of previous measures of deictic relational responding, however, is that such measures were adapted and developed originally for children. In the current study, we tested the utility of a behavioral measure of deictic relational performance that might have more ecological validity and utility as a measure with an adult population.

Acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 1999), which is an applied model of clinical intervention that emerged in conjunction with RFT, can provide additional insights into social anhedonia and its connection to psychosis. One of the core foundations of ACT is the notion of experiential avoidance, or an individual’s attempts to change the form, frequency, and intensity of private experiences despite the harmful consequences of doing so (Hayes, Wilson, Gifford, & Follette, 1996). According to RFT, this psychological process is made possible because of the relational repertoire of language-able individuals. Derived relational responding has the particular effect of exacerbating avoidance behaviors already existing in an individual’s repertoire. Once a particular event acquires avoidance functions, a myriad of arbitrary applicable contextual cues can evoke that same response. For example, if social rejection is painful, thoughts about rejection might be avoided. The individual may turn his or her attention “inside” in order to change the content and quality of his or her private experiences. The futile nature of these attempts has been extensively documented in the psychological literature (e.g., Wegner, 1994; Wegner, Schneider, Carter, & White, 1987; Wenzlaff & Wegner, 2000) and has been shown to predict psychopathology across a range of problem areas (Hayes, Luoma, Bond, Masuda, & Lillis, 2006).

The theoretical rationale of this study (see Figure 1) suggests that our understanding of psychosis proneness might be increased with the investigation of the interplay between perspective taking, empathy, and experiential avoidance. First of all, because deictic relational responding is argued to be necessary in order to take the perspective of others, and one of the properties of relational frames is the transformation of stimulus functions, deictic framing can be viewed as a foundational skill in empathy (Vilardaga, 2009). As a deictic framing repertoire increases, individuals might become more skillful at discriminating the thoughts and feelings of others, with increased empathy levels, which generally has a positive effect on these individuals’ relationships and social life (Eisenberg, 2000). However, a lack of ability to effectively manage felt emotions toward others (empathic concern) can set the stage for experiential avoidance and therefore lead to the lack of pleasure and satisfaction and, ultimately, indifference toward social interactions, which is characteristic of social anhedonia. A third perspective-taking skill (beyond deictic skill and empathy) may thus be needed to produce improved social functioning and psychological well-being, namely, the ability to mindfully accept the uncomfortable thoughts and feelings brought to bear by derived relational responding and to bring them under more appropriate contextual control (or in ACT terms, to defuse from them and to view oneself as “separate” from those private events).

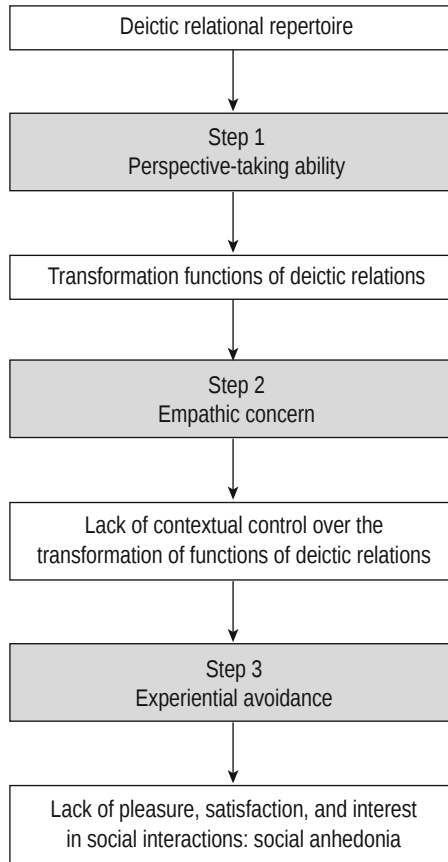


Figure 1. An RFT three-step model of social anhedonia.

The current study tested this incremental three-step psychological model, which views social anhedonia as related to deictic relational responding, empathy, and experiential avoidance, and explored the utility of a new behavioral measure of deictic relational responding. Based on this theoretical rationale and previous pilot data, we made several predictions. First, we predicted that deictic ability and empathic concern would be negatively related to social anhedonia and that experiential avoidance would be positively related. Second, we predicted that deictic ability would be positively related to empathic concern, that empathic concern would have a positive relationship with experiential avoidance, and that deictic ability would have a negative relationship with experiential avoidance. And third, given that we argued that the ability to empathize with others should be paired with the ability to accept uncomfortable thoughts, feelings, and emotions, we hypothesized that experiential avoidance would mediate the relationship between empathy and social anhedonia. This third hypothesis has indirect support in a number of studies in which experiential avoidance mediates the relationship between ACT interventions and a variety of clinical outcomes (Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2011; Hayes et al., 2006). However, the mediational role of experiential avoidance between empathy and social anhedonia has not yet been explored.

If such a model is supported, it might help orient researchers toward the development of more specific training procedures for the reduction of social anhedonia and the treatment of psychotic syndromes, especially since methods exist to modify some of these processes (e.g., Hayes et al., 1999, 2006, 2011; Rehfeldt & Barnes-Holmes, 2009).

Method

Participants and Procedure

College students ($N = 110$) from the Universidad de Deusto in Bilbao, Spain, were recruited from three different courses in psychology: research methodology (1st year), social cognition (4th year), and psychopathology (4th year). A total of 240 students were informed of the possibility of participating in an extra-credit activity, and 45.8% of them agreed to do so.

Criteria for participation included being fluent in Spanish, being a college student, and being willing to complete the 1-hr battery of questions and the behavioral task. The study complied with the requirements of the Ethics Board of the University of Deusto, and informed consent was obtained from all students. A demographic analysis of the recruited sample (see Table 1) indicated that 88.2% were female and their ages ranged between 18 and 32 years ($M = 20$, $SD = 1.82$). All participants were Caucasian. Thirty-nine percent of the participants' fathers had a Bachelor's degree, 20% had a high school degree, 25.5% had a school diploma (the equivalent of 8 years of education), and 13% never went to high school and instead received a professional degree. Very similar percentages were found for the participants' mothers.

Table 1
Sample Characteristics of College Students (N = 110), Showing Means, Standard Deviations, and Percentages Based on Raw Scores

Variable	Statistics
Demographics	
Age (years)	20.97 (± 1.82)
Female (%)	88.2
Education of father (%)	
Bachelor's degree	39.1
Professional degree	13.6
High school degree	20
School diploma ^a	25.5
Model variables	
Social anhedonia	5.65 (± 4.01)
Deictic relational responding (errors)	7.57 (± 5.41)
Empathic concern	29.01 (± 4.35)
Experiential avoidance	46.74 (± 9.07)

Note. Due to scoring, high raw scores on the experiential avoidance scale indicate low experiential avoidance. Similarly, the scores of the deictic task indicate number of errors. In subsequent presentations of these two scales, the direction of the scale was reversed to facilitate interpretation.

^aA school diploma in Spain is the equivalent of 8 years of education.

Participants completed all the measures and a behavioral task on computers with 17-in flat-screen monitors, a keyboard, and a mouse in a small classroom at the university. A computer program written in Microsoft Visual Basic for Applications and embedded into Microsoft PowerPoint was used to present subjects with the deictic relational task and the

self-report measures reported in this paper.¹ In order to avoid fatigue effects, participants initially completed a perspective-taking task, and once they finished, they were presented with global self-report measures targeting the remaining processes discussed previously. On average, participants took 14.47 min to complete the behavioral task. Each participant received the following instructions:

This study has two parts. The first part consists of a perspective-taking task. This will take approximately half an hour to complete. In the second part, we will ask you to complete several questionnaires, which will take approximately half an hour as well. Such questionnaires will explore your psychological attitudes, the thoughts, feelings, and emotions you often experience, your social relationships, etc.

After that initial instruction, participants were presented with two complete deictic framing item examples (a reversal and a double reversal) and, finally, before the beginning of the task, they were provided with the following instructions:

In summary, remember the following rules: (a) visualize, (b) respond accurately, and (c) respond fluently. Whenever you are ready, go to the next slide and you will be able to get started.

The computer task was presented in a slideshow macro-enabled presentation format to prevent participants from interacting with the task other than in the way designed. This software also allowed us to reduce acquiescence bias by avoiding the use of numerical scale values and providing instead verbal labels for the midpoints of scales (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Data for each participant were automatically labeled and transferred into a text file and then imported into a database.

Measures

Predictor variables. The Deictic Relational Task (DRT) is a behavioral measure based on a previous protocol developed by Y. Barnes-Holmes (2001) involving a series of hypothetical scenarios in which participants are asked to select the correct response based on a specific perspective. The original protocol included simple deictic relations (e.g., “I’m sitting in a red chair and you are sitting in a green chair. Which chair are you sitting in?”) as well as reversed deictic relations (e.g., “If I were you and you were me, which chair would you be sitting in?”) and double-reversed deictic relations (e.g., “If I were you and you were me and if here were there and there were here, which chair would you be sitting in?”). Reversed and double-reversed relations were designed to assess fluency and flexibility with more complex deictic relational responses.

This protocol was modified based on previous pilot studies (Vilardaga et al., 2008; Vilardaga, Waltz, et al., 2009) in which a new deictic relational measure was designed and developed to especially fit an adult population. Specifically, we created scenarios, questions, and prompts that were (a) systematically developed on the basis of core deictic relations, (b) distinct from each other, (c) highly complex, and (d) suited for natural language contexts.

The DRT used in this study consisted of a battery of 50 scenarios drawn from a pool of 375, each with a corresponding question and two response options (the appendix contains all the items). One fifth of the 50 trials that we used corresponded to each of the following trial types: reversed I-you, reversed here-there, reversed now-then, double-reversed I-you/here-there, and double-reversed here-there/now-then. The reader should keep in mind that most of the reversed or double-reversed trials did not necessarily include the words *I*, *you*, *here*, *there*, *now*, and *then*. As discussed in Hayes et al. (2001), and more directly by Y. Barnes-Holmes, McHugh, and Barnes-Holmes (2004), the terms *I-you*,

¹ We want to thank Ruth Anne Rehfeldt for providing us with an initial version of Visual Basic for Applications code that we further developed to meet the needs of our study.

here-there, and *now-then* refer to relational frames that must be functionally and not formally defined. In that spirit, we created items that addressed that core relation without necessarily using the exact words *I* and *you*, *here* and *there*, or *now* and *then*. For example, Item 33 reads, "Alonso is sharing his snack with his buddy, and Clarke is stealing a chip from his classmate. If Alonso were Clarke, what would he have in his hands?" In this item, the verbal cue "If Alonso were Clarke" is intended to evoke an I-you framing response. We assumed that a protocol involving a set of contextual cues that were systematically different from each other would allow participants to more reliably identify responses based on the underlying deictic relations.

We also completely changed the overall contents of each trial so that participants were not distracted by the repetition of similar words. Whereas in the protocol developed by Y. Barnes-Holmes (2001), multiple items contained the words *green brick* and *red brick*, in the current protocol, not a single trial used the same content as in any other trial. Each trial used names of objects, places, and scenarios that were different from each other. Item 22 of this new protocol reads, "Sue is imitating a bird call, and Marley is chirping at the cat. If Marley were Sue, what would she be doing?" The actions imitating a bird call and chirping at the cat had not been presented in prior items; however, the functional relations that this trial is designed to evoke remained the same. Another aspect that differed from the protocol developed by Y. Barnes-Holmes is that our protocol only included reversed and double-reversed trials. The reason we excluded simple trials was because in our pilot studies (Villardaga et al., 2008; Villardaga, Waltz, et al., 2009), we observed a clear ceiling effect: College students often made close to zero mistakes with simple trials and, therefore, in our view, these trials were not capable of generating enough variability to produce meaningful data.

The ordering of the presentation of the scenarios was randomized for this particular sample. The trials were translated into Spanish and adapted to the particular cultural and regional context of the participants. Each scenario was presented for as long as the participant needed, as a way to control for deficits in attention and working memory. After clicking a button, the participant was presented with a different slide with two emerging response options. All participants had the same two response options available, and since this specific task was developed as a measure tool and not as a training tool, they did not receive corrective feedback in cases in which they made an error. Figure 2 depicts one of the original trials presented to participants. More frequent errors on this task indicate lower deictic relational ability, but in order to facilitate interpretation, we reversed the sign of the regression coefficients so that higher scores on this scale indicated higher deictic ability.

The Acceptance and Action Questionnaire (AAQ; Hayes et al., 2004), along with its most recent version, the AAQ-II (Bond et al., 2011), is a self-report measure of experiential avoidance. The AAQ-II contains 10 items rated on a 7-point Likert scale ranging from 1 (*never true*) to 7 (*always true*). Item 1, for example, reads, "It's OK if I remember something unpleasant." The AAQ has been found to have adequate internal consistency and construct validity (Hayes et al., 2006), with Cronbach's alpha coefficients in the range of .76 to .87. The current study used a Spanish version of the AAQ-II that was previously validated in this population (Langer, Ruiz, Cangas, & Luciano, 2009). In our sample, this measure had good internal consistency ($\alpha = .83$). The original scoring of this scale was written so that higher scores on this scale indicate lower experiential avoidance. However, in order to facilitate interpretation, we changed the sign of the scale so that higher scores indicated higher experiential avoidance.

The Interpersonal Reactivity Index (IRI; Davis, 1983) is a multidimensional self-report measure of empathy that includes four different seven-item subscales. The Empathic Concern subscale was used in the present study. It evaluates the tendency to experience compassion and sympathy for others, with items such as "When I see someone being treated unfairly, I sometimes don't feel very much pity for them." The IRI has been extensively validated in previous studies, with an internal consistency that ranges from .71 to .77 (Davis, 1980). The current study used a Spanish language version of the scale that

had been previously validated in this specific population (Perez-Albeniz, de Paul, Etxeberria, Montes, & Torres, 2003). In our sample, Cronbach's alpha was .79 for the Empathic Concern subscale. High scores on this subscale indicate high levels of empathy.



Figure 2. Item 1 of the Spanish version of the Deictic Relational Task.

Criterion variables. The Revised Social Anhedonia Scale (rSAS; Eckblad, Chapman, Chapman, & Mishlove, 1982) contains 40 items that assess deficits in the ability

to experience pleasure from social situations, such as talking to others and exchanging expressions of feelings. Items in this scale have two response options, “true” or “false.” An example item from this scale is “Having close friends is not as important as many people say.” The scale has been found to have a Cronbach’s alpha of .79 (Mishlove & Chapman, 1985). The current study used a Spanish version of this questionnaire that had been validated in this population and has an internal consistency that ranges between .79 and .88 (Muntaner, García-Sevilla, Fernández, & Torrubia, 1988). The rSAS was found to have adequate internal consistency in our sample as well ($\alpha = .75$). Higher scores on this scale indicate higher social anhedonia.

Data Analytic Strategy

We examined frequencies and histograms, calculated skewness and kurtosis, and evaluated accuracy of data entry, missing values, outliers, and fit with assumptions for the variables used in the analyses (Tabachnick & Fidell, 2007). Only 2.5% of the items of the rSAS were missing, and we opted to impute those values through a mean substitution procedure (Cohen, Cohen, West, & Aiken, 2003). There were no other missing data in any other variables. The rSAS was substantially negatively skewed and kurtotic, so a Log10 transformation was applied. The statistical parameters and graphic inspection showed that this transformation produced a near normal distribution, as indicated by the Shapiro-Wilk normality test ($p > .01$), and that skewness and kurtosis statistics were within appropriate range (± 1).

The Empathic Concern subscale of the IRI had a moderate level of negative skewness, so a square root transformation was applied. This produced a stronger fit with the assumptions, as indicated by graphic inspection, the statistical levels of skewness and kurtosis, and the nonsignificance of the Kolmogorov-Smirnov normality tests ($p > .01$). The only dichotomous variable, gender, did have an unbalanced split (82% to 12%), which suggested that we retain this variable in our analyses. Given that this was a sample of college students, age had a considerable right tail and therefore we also retained this variable in our analysis. Table 1 presents raw scores to facilitate interpretation.

For the DRT, participants who demonstrated an overall accuracy rate below 65% across deictic trials were removed from the analyses. This criterion was used in order to control for participants who were likely to be randomly responding and therefore not engaging in the task. Villatte et al. (2010b) used a similar criterion to identify such response patterns. This rationale led to the removal of eight participants from the final analysis, resulting in a total sample of 102 participants.

The relative importance of these three processes was tested using multiple and sequential multiple regression. The latter analytic strategy allowed us to weigh the differential effect of each predictor after controlling for each other and, therefore, to evaluate their relative importance. The first sequence included two different controls, age and gender. In the second sequence, scores on the DRT were entered. This variable was entered early in the sequence because our theoretical rationale proposes that deictic relational responding provides the basis for the other psychological processes tested. In the third sequence, the Empathic Concern subscale of the IRI was entered. Finally, in the fourth sequence, the AAQ-II was entered. The ratio of cases to predictor variables was within the range recommended by the literature (Tabachnick & Fidell, 2007).

In addition to multiple sequential regressions, we conducted a nonparametric product of coefficients test (Preacher & Hayes, 2008), in order to test the hypothesis that the relationship between empathic concern and social anhedonia could be mediated by experiential avoidance after controlling for age and gender. This analytic approach tests the significance of the cross-product of the *a* and *b* paths, which is mathematically equivalent to the difference between the direct and the indirect paths (Preacher & Hayes, 2008). This method provides a means of directly testing whether a mediator accounts for the relationship between predictor and outcome. To remediate the lack of normality of the cross-product of coefficients, we used a nonparametric bootstrapping method, as

recommended by Preacher and Hayes (2008). In our analysis, we set up the program to extract 5,000 samples, which is more than sufficient to find stable parameter estimates, according to the literature (Freedman, 2001).

Results

Descriptive Statistics

All the variables entered in the model had low zero-order correlations (see Table 2). The largest significant correlation was between the rSAS and the AAQ-II ($r = .41$). This suggests that the scales chosen for the model were measuring sufficiently distinct processes, which was confirmed by the statistical levels of tolerance in the sequential regression, the smallest of them being .84.

Table 2
Zero-Order Correlations (N = 102) of Variables Entered in Our Regression Analysis

Variables	1	2	3	4	5
1. Social anhedonia					
2. Deictic ability	-.27*				
3. Empathic concern	-.29**	.13†			
4. Experiential avoidance	.38**	-.16†	.03		
5. Age	-.08	-.05	.23*	-.22*	
6. Gender	-.17*	.17*	.30**	-.11	-.05

† $p < .10$. * $p < .05$. ** $p \leq .001$.

The levels of social anhedonia of our sample were compared to the norms provided by the developers of the rSAS in an unpublished study using a nonclinical sample of college students in introductory psychology courses (T. R. Kwapil, personal communication, August 23, 2009). Our sample ($N = 110$) had a mean score of 5.27 ($SD = 3.70$) for females and 8.44 ($SD = 5.21$) for males, which falls within the range of values reported there ($M = 8.91$, $SD = 5.12$, for males, and $M = 6.78$, $SD = 4.49$, for females). Muntaner et al. (1988), in a sample of college students in Barcelona, Spain, reported higher values than those reported by Kwapil ($M = 11.64$, $SD = 5.56$, for males, and $M = 8.91$, $SD = 4.53$, for females). The current sample was still within 1 SD of the means reported by Muntaner et al., which was representative of a nonclinical sample.

Sequential Multiple Regressions

The overall analysis of variance of the fourth step of the sequential regression was statistically significant, $F(5, 96) = 6.68$, $p < .001$, suggesting that we produced a workable model. The amount of variance accounted for by each variable entered in the model was as follows. In the first step, age and gender did not account for a statistically significant amount of the variance, $\Delta F(2, 99) = 1.87$, $p = .160$. In the second step, deictic ability increased the amount of variance accounted for to 6.4%, $\Delta F(1, 98) = 6.914$, $p = .010$, above and beyond demographic variables. This increment continued with the addition of empathic concern, which increased the amount of variance accounted for to an additional 4.6%, $\Delta F(1, 97) = 5.172$, $p = .025$, above and beyond deictic ability and demographics. In the final step, experiential avoidance added 11.3% to the amount of the variance accounted for by the overall model, $\Delta F(1, 96) = 14.599$, $p < .001$, above and beyond the previously entered factors. Globally, the model accounted for 26% (22% adjusted) of the total variance in the prediction, which according to Cohen et al.'s (1992) criteria, constitutes a large effect size. The individual contribution of each variable to the overall model can be found in Table 3 and is discussed later.

Table 3
Model Summary of Sequential Regression Analysis by Blocks of Variables Predicting Social Anhedonia (N = 102)

Predictors	R^2	ΔF	β	95% CI
Step 1	.036	1.865		
Gender			-.17	[-.308, .018]
Age			-.09	[-.042, .016]
Step 2	.10*	6.914		
Gender			-.13	[-.270, .052]
Age			-.10	[-.043, .014]
Deictic ability			-.26*	[.004, .029]
Step 3	.15*	5.172		
Gender			-.06	[-.218, .113]
Age			-.04	[-.035, .023]
Deictic ability			-.23*	[.003, .027]
Empathic concern			-.23*	[.010, .148]
Step 4	.26**	14.599		
Gender			-.02	[-.172, .139]
Age			.05	[-.020, .035]
Deictic ability			-.18†	[.000, .023]
Empathic concern			-.26*	[.024, .154]
Experiential avoidance			.35**	[-.015, -.005]

† $p < .10$. * $p < .05$. ** $p \leq .001$.

Mediation Analyses

Using the nonparametric product of coefficients test (Preacher & Hayes, 2008), we tested the hypothesis that experiential avoidance would mediate the relationship between empathic concern and social anhedonia after controlling for age and gender. Results indicated that experiential avoidance was not a significant mediator (bootstrapped point estimate = $-.009$, $SE = .014$, 95% $CI_{95} = -.039, .019$). Figure 3 represents all of the paths of the mediation model. Although there was a significant relationship between experiential avoidance and social anhedonia after controlling for empathic concern ($b = -.01$, $SE = .00$, $t = -4.14$, $p < .001$), there was not a significant relationship between empathic concern and experiential avoidance ($b = .78$, $SE = 1.24$, $t = .63$, $p = .53$).

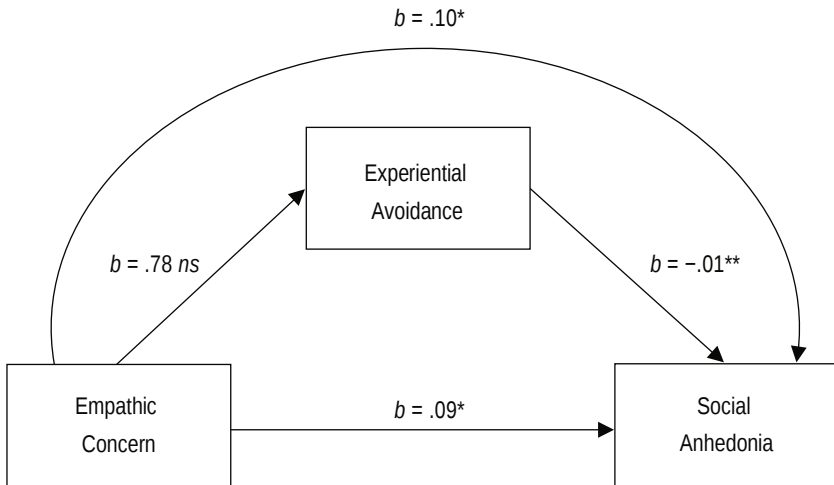


Figure 3. Test of the mediational effect of experiential avoidance between empathic concern and social anhedonia. * $p < .05$. ** $p \leq .001$. ns = not statistically significant, $p > .05$.

Discussion

The current study suggests that deictic framing, empathy, and experiential avoidance may all play a role in social anhedonia (see Figure 4), giving support to our first prediction. The variance accounted for by each step of the regression was incremental. Deictic ability alone accounted for 10% of the total variance (above and beyond demographic variables). When empathic concern was added to the model, both it and deictic framing significantly accounted for 15% of the total variance. When experiential avoidance was added to the model, the three variables accounted for 26% of the total variance. Empathy and experiential avoidance were statistically significant (with confidence intervals of $CI_{95} = .024, .154$, and $CI_{95} = -.015, -.005$, respectively), whereas deictic ability fell just across the line to marginal statistical significance when competing with these two other processes in the final step ($b = .01, SE = .01, \beta = .18, t = 1.94, p = .056, CI_{95} = .000, .023$). Although this study reached recommended sample size standards (Tabachnick & Fidell, 2007), our sample was not large, and given the significant results in the other steps, this confidence interval seemed interpretable. The overall model had a large effect size (Cohen et al., 2003), which given the cross-sectional design of this study, indicated strong association between the proposed predictors and social anhedonia.

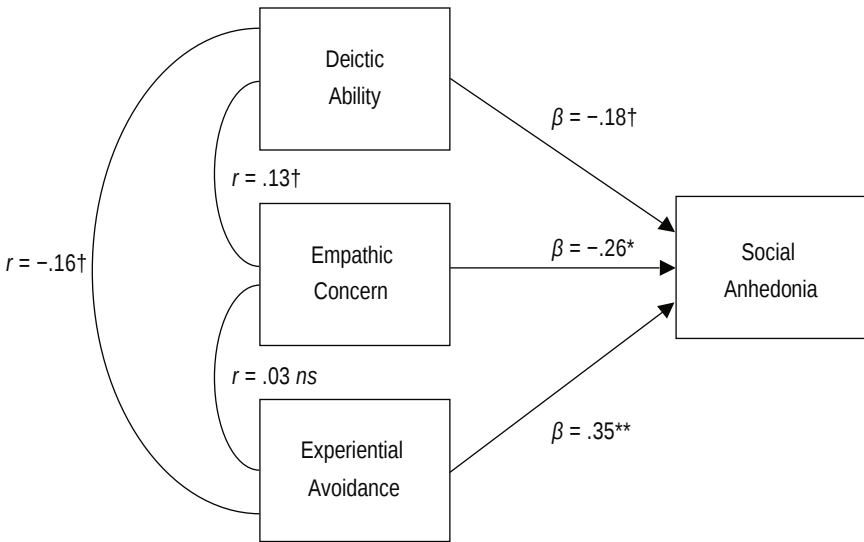


Figure 4. Regression model of deictic ability, empathic concern, and experiential avoidance as predictors of social anhedonia after controlling for age and gender. † $p < .10$. * $p < .05$. ** $p \leq .001$. *ns* = not statistically significant, $p > .05$.

A unique contribution of this study is that the behavioral task that we employed to evaluate deictic framing constitutes the first of its kind. Previous pilot studies (Vilardaga et al., 2008; Vilardaga, Waltz, et al., 2009) led to the development of a series of items that we thought would be more appropriate for an adult population in terms of cognitive complexity and acceptability for this age range. The previous deictic protocols used by Villatte et al. (2008, 2010a, 2010b) and McHugh et al. (2004) were slightly longer in terms of number of trials. For example, whereas the protocol used by McHugh et al. had 62 trials, our protocol had 50 trials, mainly because of the removal of simple trials (e.g., “I have a red brick and you have a green brick. Which brick do I have? Which brick do you have?”). Our protocol seemed to produce different patterns of responses among participants. Among adult individuals, our deictic protocol and procedure produced shorter latency levels paired with higher accuracy rates. The average time to respond to our items was 3.47 s with an overall accuracy rate of 97.34%, whereas in Villatte (2008), average response

time was 8.86 s with an overall accuracy rate of 76.42%. Furthermore, in our sample, latency and accuracy had a statistically significant negative correlation ($r = -.55, p = .000$), indicating that longer latencies were associated with lower error rates, as opposed to the findings in Villatte et al.'s (2008) study. Neither in our procedure nor in Villatte et al.'s (2008, 2010a, 2010b) was there a time cap that prompted individuals to respond faster, so this hypothesis should be ruled out. These differences in latency time could be due to the fact that in the protocol we developed, every trial provided a unique and new scenario, making our task less cognitively demanding.

Previous protocols have assumed that shorter latency times should be correlated with higher deictic framing accuracy, but it can also be argued that shorter latencies are the result of the individuals' lack of willingness to commit to the difficult tasks they were presented with. In fact, we found a statistically significant negative correlation between latency and experiential avoidance ($r = -.32, p = .001$). The relationship between latency and accuracy in our data is a topic that goes beyond the scope of the current paper, but our study seems to give support to further elaborations of the protocol originally developed by Y. Barnes-Holmes (2001) for this specific target population, raising important questions that should be addressed in future research.

It should be noted that this measure offers some practical advantages as well. For example, some perspective-taking tasks require specific experimental procedures, such as role playing or videotape watching, that are often logistically complex and time consuming (e.g., Chandler, 1973; Saltz, Dixon, & Johnson, 1977).

Our second set of predictions was not fully supported. Our prediction that deictic ability would have a positive relationship with empathic concern was a marginally significant relationship, although in the expected direction. In line with that, feeling empathy toward others did not lead to significantly high levels of interpersonal discomfort potentially conducive to experiential avoidance, although the direction of that relationship was as we predicted it to be. Deictic ability was negatively related to experiential avoidance, but this relationship was marginally significant as well. Finally, our third prediction was that experiential avoidance would mediate the relationship between empathic concern and social anhedonia. This prediction was not supported (see Figure 3). Instead, empathic concern continued to relate to social anhedonia independently of the effect of experiential avoidance. It is possible that the lack of sample power lies behind these results; however, this needs to be ruled out with larger studies.

Mediation analyses are particularly useful when trying to find core processes of change at the root of constructs that need a more theoretically sound explanation. For example, in a recent study, Merwin, Rosenthal, and Coffey (2009) found that the relationship between sexual victimization and psychological symptoms was consistently mediated by experiential avoidance, which led to the conclusion that experiential avoidance may be an important main intervention target when treating problems derived from sexual victimization, rather than targeting sexual victimization per se. In contrast, the results of our study indicate that these three processes are robust and independent predictors of social anhedonia, as indicated by their low levels of correlation and the lack of statistical mediation between relevant variables. Thus, these results suggest that interventions targeting social anhedonia may benefit from targeting each one of these predictors.

There have been a number of studies from different disciplines indicating that experiential avoidance, empathy, and deictic ability are important processes related to normal functioning and psychopathology. Experiential avoidance seems to be a common path to psychopathology and other milder problems related to general functioning. The ACT literature has shown that experiential avoidance relates to a series of clinical and subclinical problems that range from posttraumatic stress disorder (Batten, Follette, & Aban, 2001), depression (Zettle & Hayes, 1987), borderline personality disorder (Gratz & Gunderson, 2006), and psychosis (Bach & Hayes, 2002; Gaudiano & Herbert, 2006; Gaudiano, Herbert, & Hayes, 2010) to job stress (Bond & Bunce, 2001) and counseling burnout (Vilardaga et al., 2011).

Empathy researchers, on the other hand, have found that the ability to connect and experience feelings of concern toward other individuals relates to a series of positive outcomes, such as interpersonal functioning and prosociality (Batson, Turk, Shaw, & Klein, 1995; Eisenberg, 2000). This process seems to be central, especially in social groups, for which emotions are one of the means to bring about cohesion. In that same context, deictic framing, or the relational ability to take perspective, is also important. Perspective taking alone relates to positive outcomes (Underwood & Moore, 1982), such as increases in knowledge and social competence (Silvern, Waterman, Sobesky, & Ryan, 1979) and the reduction of impulsive behaviors (Saltz et al., 1977). Furthermore, researchers have found that impairments in perspective taking are present in schizophrenia (Corcoran, Mercer, & Frith, 1995; Frith & Corcoran, 1996).

The data in the current study also support the distinction between the processes of being able to take perspective and feeling empathetic toward others: One can be quite capable of taking the perspective of others and not feeling concern for their situation. This was recently discussed by Valdivia-Salas, Luciano, Gutiérrez, and Visdómine (2009) in a volume on derived relational responding (Rehfeldt & Barnes-Holmes, 2009), although some evolutionary theorists have gone even further by suggesting that empathy is shaped phylogenetically and not ontogenetically, concluding that empathic responses do not depend on our learning and cultural makeup (Preston & de Waal, 2002). Those very same proponents still argue that such responses, which are shaped throughout the evolutionary history of a species, can still be incremented during the course of an individual's life and turned into what we call *empathic concern* (de Waal, 2008), which is the specific construct that we targeted in this study.

There are limitations to this study. The study design, although common, does not grant the same strong inference as would experimental manipulation of relevant variables or analysis of those factors longitudinally. The importance of the three processes presented in this paper thus needs to be considered with caution, and the effect sizes reported throughout should be interpreted as critical measure of association but not causation. Future analog and intervention studies that employ experimental procedures, especially within a longitudinal design, are needed. Second, although the incorporation of a behavioral measure of deictic ability constitutes a step forward in the translational effort to bring together basic and clinical behavioral science and reduces problems with method variance (Podsakoff et al., 2003), the development of behavioral tasks to measure empathic concern and experiential avoidance would be highly desirable.

Third, the mediation analyses performed with these data were conducted without introducing temporal separation between hypothesized predictor, mediator, and outcome variables. This procedure followed the steps proposed by Preacher and Hayes (2008), but as noted by MacKinnon, Fairchild, and Fritz (2007), mediation analysis *per se* cannot be used as a shortcut to avoid the elaboration of sound theoretical accounts, which is what we supplied when we backed up our predictions with previous work on RFT and ACT.

Finally, in this study, we used a sample of college students. Regardless of the self-evident practical convenience of this sample, this population is particularly appropriate since social anhedonia is a predictor of psychosis, which generally emerges close to this age range. Selecting these populations is an approach that has been followed by previous studies on social anhedonia and psychosis proneness (Chapman et al., 1994; Kwapil, 1998b; Muntaner et al., 1988).

Conclusion

Meehl (1962) and Chapman et al. (1976) emphasized the importance of specific measures to identify psychosis proneness and the isolation of variables such as social anhedonia that would predict it. The current study adds to the literature by indicating that rather than targeting social anhedonia directly as a way to prevent the development of psychosis in the long term, it could be more productive to use known behavioral technologies

that undermine the psychological processes of experiential avoidance, the strengthening of perspective-taking skills, and the development of empathy. Some of these technologies are already available, such as ACT, whose primary target is experiential avoidance. In addition, RFT researchers and practitioners are already developing procedures to train perspective-taking and empathy skills (Rehfeldt & Barnes-Holmes, 2009).

In order to make progress in understanding social anhedonia, an iterative process of linking research in processes of change with specific intervention techniques, and vice versa, needs to be undertaken (Vilardaga, Hayes, Levin, & Muto, 2009). The present study, building on Villatte et al.'s (2008, 2010a, 2010b) previous work, was intended as a step in that direction.

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Appendix

Original items of the Deictic Relational Task in English follow. Correct answers are indicated with an asterisk.

1. Destiny is at Cornell University defending a dissertation, and Darin is at Georgetown University teaching a lecture. If Darin were Destiny and if Cornell University were Georgetown University, where would Darin be?
 - a. At Georgetown*
 - b. At Cornell
2. Right now, Timothy is walking his neighbor's dog, but tomorrow in the afternoon he will be getting paid \$10. If now were tomorrow in the afternoon, what would Timothy be doing?
 - a. Getting paid \$10*
 - b. Walking his neighbor's dog
3. Calise is at Laguna Beach meditating in the sand, and Theodore is in the Mediterranean Sea floating on a raft. If Calise were Theodore and if the Mediterranean Sea were Laguna Beach, where would she be?
 - a. At Laguna Beach*
 - b. At the Mediterranean Sea
4. Right now, Bianca is trying on clothing in a dressing room in Elko, and in four years she will be designing clothing in an office in Austin. If now were in four years and if Austin were Elko, where would she be?
 - a. In Elko*
 - b. In Austin
5. Now Roberta is putting shaving cream on her sleeping friend's fingers, and twenty seconds later she will be tickling her friend's nose. If now were twenty seconds later, what would Roberta be doing?
 - a. Putting shaving cream on her friend's fingers
 - b. Tickling her friend's nose*
6. Maddox is floating in the pool, and Tristan is jumping off of the diving board. If Tristan were Maddox, what would he be doing?
 - a. Floating in the pool*
 - b. Jumping off the diving board
7. Duke is watching the sunset on the rooftop, and Dafney is watching TV in the living room. If the rooftop were the living room, what would Duke be watching?
 - a. The television*
 - b. The sunset
8. Kayla is windsurfing off the coast of Honolulu, and Ace is chopping firewood in Mount Everest. If Honolulu were Mount Everest, what would Kayla be doing?
 - a. Windsurfing
 - b. Chopping wood*
9. Mickey is entertaining friends, and Susanna is playing the guitar. If Mickey were Susanna, what would he be doing?
 - a. Entertaining friends
 - b. Playing the guitar*

10. Faith is picking up her nephew from the bus stop. Juno is buying his nephew a soda at the movie theater. If the bus stop were the movie theater, where would Faith be?
 - a. Bus stop
 - b. Movie theater*
11. Today Guadalupe is doing laundry, and tomorrow she will be relaxing on the beach. If today were tomorrow, what would Guadalupe be doing today?
 - a. Relaxing on the beach*
 - b. Doing the laundry
12. Right now, Betsy is exfoliating her skin at a massage parlor in Indianapolis, and in two weeks she will be modeling in a fashion show at a concert hall in Orlando. If it were two weeks from now and Orlando were Indianapolis, where would she be?
 - a. In Orlando
 - b. In Indianapolis*
13. Darwin is catching a frog in the Everglades, and Amelia is trapping a wolf in the Appalachians. If Amelia were Darwin, what would she be doing?
 - a. Catching a frog*
 - b. Trapping a wolf
14. Now Hector is having dinner, but three hours ago he was standing in line at the ice cream parlor. If now were three hours ago, what would Hector be doing?
 - a. Standing in a line*
 - b. Having dinner
15. Yanni is picking a rose from the rose garden, and in an hour he will be handing the rose to his spouse at a fancy restaurant. If it were an hour from now and the restaurant were the garden, where would Yanni be?
 - a. In the garden*
 - b. At the restaurant
16. Kingston is in Manchester getting knighted by the queen, and Martin is in Ethiopia building a hut. If Martin were Kingston and if Manchester were Ethiopia, where would Martin be?
 - a. In Manchester
 - b. In Ethiopia*
17. Plato is discussing the republic and Aristotle is lecturing in Athens. If Aristotle were Plato, what would he be doing?
 - a. Lecturing
 - b. Discussing the republic*
18. Right now, Marco is styling his hair, and two hours later he will be dancing at a rave. If it were two hours from now, what would Marco be doing?
 - a. Styling his hair
 - b. Dancing*
19. Louis is in Los Andes analyzing sediments, and Crystal is at the Kilimanjaro searching for the origin of a river. If Louis were Crystal and if the Kilimanjaro were Los Andes, where would he be?
 - a. Los Andes*
 - b. Kilimanjaro

20. Gilbert is at the Laundromat folding clothes; Carolyn is at the salon getting a pedicure. If Gilbert were Carolyn and if the salon were the Laundromat, where would he be?
 - a. Laundromat*
 - b. Salon

21. Right now, Hampton is riding a donkey in the Grand Canyon, and next summer he will be sailing in the Caribbean Sea. If now were next summer and the Caribbean Sea were the Grand Canyon, where would he be?
 - a. Grand Canyon*
 - b. Caribbean Sea

22. Sue is imitating a bird call, and Marley is chirping at the cat. If Marley were Sue, what would she be doing?
 - a. Imitating a bird call*
 - b. Chirping at the cat

23. Kay is floating newspaper boats down the stream at the gutter; Jay is ordering pasta at an Italian restaurant. If the Italian restaurant were the gutter, where would Jay be?
 - a. At the gutter*
 - b. At the restaurant

24. Floyd is digging a hole in Death Valley, and next winter he will be making snow angels in the Alps. If now were next winter, and the Alps were Death Valley, where would Floyd be?
 - a. In Death Valley*
 - b. In the Alps

25. Lawrence is throwing darts in a pub; Jean is catching fish in an aquarium. If the aquarium were the pub and the pub the aquarium, where would Jean be?
 - a. At the pub*
 - b. At the aquarium

26. Right now, Fabio is posing for the camera, and in five hours he will be sitting in a hot tub. If it were five hours from now, what would Fabio be doing?
 - a. Posing for the camera
 - b. Sitting in a hot tub *

27. Clementine is in the stable feeding the horses, and Cole is laying carpet in the doghouse. If Clementine were Cole and if the doghouse were the stable, where would she be?
 - a. In the stable*
 - b. In the doghouse

28. Brenda is in Sicily eating Sicilian food, and Glenn is in Bangkok eating Thai food. If Brenda were Glenn and if Bangkok were Sicily, where would she be?
 - a. In Sicily*
 - b. In Bangkok

29. Desiree is trying on a bathing suit at the mall, and Drew is buying a Halloween costume. If Drew were Desiree, where would he be?
 - a. At the mall*
 - b. At the costume store

30. Harrison is at the magic store invoking the fire spirit, and Fidel is at the art castle with a stake through a vampire's heart. If the magic store were the castle, where would Harrison be?
 - a. At the art castle*
 - b. At the magic store

31. Today Ignacio is lighting a cigarette, and in seven years Ignacio will be quitting smoking. If now were in seven years, what would Ignacio be doing?
 - a. Lighting a cigarette
 - b. Quitting smoking*
32. Right now, Leslie is working in a dentist's office and Karla is at home raising her family. If Karla were Leslie, where would she be?
 - a. At the dentist's office*
 - b. At home
33. Alonso is sharing his snack with his buddy, and Clarke is stealing a chip from his classmate. If Alonso were Clarke, what would he have in his hands?
 - a. A snack
 - b. A chip*
34. Tina is going to college downtown, whereas Consuelo is starting to crawl at the playground. If Tina were Consuelo, where would she be?
 - a. At the playground*
 - b. At college downtown
35. Grandma is fixing supper for the family, and Grandpa is barbecuing ribs for the neighbors. If Grandma were Grandpa, where would she be?
 - a. In the kitchen
 - b. Out on the porch*
36. Bela is watering her flowers in her apartment in New York, and Nestor is in the North Pole ice fishing. If New York were the North Pole, where would Bela be?
 - a. In New York
 - b. At the North Pole*
37. Today Anthony is doing a favor for his friend, and two months from now he will be asking for this favor to be returned. If it were two months from now, what would Anthony be doing?
 - a. Doing a favor for his friend
 - b. Asking his favor to be returned*
38. At this moment, Alejandro is fighting a forest fire in the Rocky Mountains, but in a month he will be kayaking in the American River. If it were a month from now and if the American River were the Rocky Mountains, where would Alejandro be?
 - a. In the Rocky Mountains*
 - b. In the American River
39. Right now, Margery is stacking her stuff in her yard, and in forty-five minutes she will be putting a yard sale sign up. If it were forty-five minutes from now, what would Margery be doing?
 - a. Stacking her stuff in her yard
 - b. Putting a yard sale sign up*
40. Ingrid is picking four-leaf clovers in a field, and Violet is staining wood on a balcony. If the balcony were the field, where would Violet be?
 - a. In a field*
 - b. On a balcony

41. Ziggie is in the Yellow Sea surfing twenty-foot waves, and Belev is in Australia living with the aborigines. If Ziggie were Belev, and if Australia were the Yellow Sea, where would Ziggie be?
 - a. In the Yellow Sea*
 - b. In Australia
42. Vespera is at the oasis chugging water, and Mario is in the desert suffering from heat exhaustion. If Mario were Vespera and if the oasis were the desert, where would Mario be?
 - a. In the oasis
 - b. In the desert*
43. Alexa is stringing her guitar in a garage in Dallas, but in three years she will be playing at a rock concert on a stage in Dublin. If it were three years from now and if Dublin were Dallas, where would Alexa be?
 - a. In Dallas*
 - b. In Dublin
44. Today Cain is marrying the woman of his dreams, and in nine months he will be watching her give birth. If it were nine months from now, what would Cain be doing?
 - a. Watching his wife give birth*
 - b. Getting married
45. Jude is in the bleachers watching the band, and Gretchen is on stage appearing with the band. If Jude were Gretchen and if the stage were the bleachers, where would Jude be?
 - a. In the bleachers*
 - b. On stage
46. Becky is flying a hot air balloon over the city in Reno, and Martha is parasailing in Crater Lake. If Crater Lake were Reno, where would Martha be?
 - a. In Reno*
 - b. In Crater Lake
47. Tilly is chewing gum at the corner of the street, and Savannah is eating dessert at home. If Savannah were Tilly and if the corner of the street were Savannah's home, where would Savannah be?
 - a. At the street corner
 - b. At Savannah's home*
48. Now Delilah is scuba diving in the Great Barrier Reef, but in forty years she will be putting on makeup while driving on the freeway in San Jose. If it were 40 years from now and the freeway in San Jose were the Great Barrier Reef, where would Delilah be?
 - a. On a freeway
 - b. In the Great Barrier Reef*
49. At this moment, Alfonzo is jumping six buses on a motorcycle in a junkyard, and in half an hour he will be laughing on a talk show in the studio. If it were half an hour from now and the studio were the junkyard, where would Alfonzo be?
 - a. In the junkyard*
 - b. In the studio
50. Marvin is on the bluff overlooking the ocean and releasing the ashes of a beloved one, and Carl is in a gas station buying a cup of coffee. If the bluff were the gas station, where would Marvin be?
 - a. On the bluff
 - b. In the gas station*