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Cultural influences in the theory of mind

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Abstract

Theory of mind, also called mindreading or mentalizing, is the ability to ascribe mental states to oneself and others in order to explain, predict and manipulate behaviour. A large number of developmental studies have focused on mindreading and how it emerges throughout infancy and childhood, but relatively few have focused on individual differences in adulthood, and potential modulators of this capacity. One important possible modulator is culture. People from other cultural backgrounds sometimes seem inscrutable. Investigating how cultural information affects adults' mindreading reasoning may therefore shed new insights on this process. The main aim of the present thesis was to find out whether complex mental state attribution and its response times are modulated by cultural information about the target. In order to answer these questions, we carried out two experiments in which culturally adapted versions of the Strange Stories task (White, Hill, Happé & Frith, 2009) were administered to participants of the same or a different cultural background. Specifically, in Experiment 1, Australian participants were randomly allocated to one of two conditions. In the Australian condition, names, pictures, places and objects were adapted to match to an Australian context, in the Cross-cultural condition the Australian participants were shown targets belonging to different cultural backgrounds. Results showed that participants gave faster and more accurate mindreading responses for targets that matched their cultural background, relative to cross-cultural targets. Experiment 2 was similar to Experiment 1, but with two main modifications: (1) Australian participants were presented with Strange Stories that depicted a single (as opposed to multiple) different cultural backgrounds (namely, Chile) and (2) a Chilean sample was also recruited, and asked to complete intra- and Australian versions of the Strange Stories task. As in Experiment 1, for both Australian and Chilean samples, accuracy was higher in the intracultural relative to the cross-cultural mentalizing conditions. There was also some evidence for increased reaction time in the intracultural condition, but this was only significant for one of the two cultural groups. Taken together, these results provide evidence for differential cultural effects on mindreading reasoning. These data therefore contribute to ongoing debate about whether mindreading ability differs in our day-to-day social interactions with people that

belong to different cultural backgrounds, with potentially important implications for cross-cultural communication and understanding.

Declaration by author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

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Publications during candidature

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Contributions by others to the thesis

My supervisor, Professor Virginia Slaughter, contributed to the conception and design of the research project and critically revised and proofread all sections of this thesis. My co-supervisor A/Prof Julie Henry proof-read and revised critically all sections of this thesis.

Statement of parts of the thesis submitted to qualify for the award of another degree

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List of Abbreviations used in the thesis

ANOVA	:	Analysis of Variance
IAT	:	Implicit Association Test
IFC	:	Inferior Frontal Cortex
mPFC	:	medial Prefrontal Cortex
pSTS	:	posterior Superior Temporal Sulcus

CHAPTER 1: INTRODUCTION

1. General introduction

Cross-cultural communication and understanding can be challenging. Even if linguistic barriers can be crossed and allowances made for differing behavioural norms, it is still sometimes the case that foreigners seem ‘inscrutable’ (see e.g., Mathur, 1991 for a fictional account). The present thesis suggests a possible cause of this phenomenon: We are less accurate when “mindreading” people from a different culture.

Mindreading, also known as theory-of-mind or mentalizing, is defined as the ability to ascribe internal mental states including desires, beliefs and feelings, to other people in order to explain and predict their behaviour (Wellman, Cross & Watson, 2001). However, most of the studies on mindreading have focused on infants and children, with relatively few focused on adults. This relative lack of interest in adult cohorts is striking because adult cognitive processes are important to assess in order to understand how mature mentalistic reasoning should work under typical circumstances (Apperly, 2010). A broader comprehension of adult mindreading reasoning should offer new insights not only into the accuracy of online mindreading process, but also in modulator processes that affect this ability.

There are several studies involving adults that have revealed that the accuracy of this reasoning is affected by participants’ self-knowledge (Birch & Bloom, 2004, 2007; Keysar, Linn & Barr, 2003), the degree of similarity to others (Mitchell, Macrae & Banaji, 2006), differences in social role (Rutherford, 2004), ageing (Philips et al., 2011), cultural experience (Luk, Chiao & Cheung, 2012; Wu y Keysar, 2007) and of greatest relevance to the present thesis, the cultural identity of the mindreading target (Adams et al., 2010). However, relatively little is known about exactly when and how culture is likely to affect mentalistic reasoning. The main aim of the present thesis was therefore to further explore how the cultural identity of mindreading targets affects this critical human capacity.

However, one important challenge that adult mindreading research has to overcome is linked to appropriate methodologies. Specifically, there are relatively few mindreading tasks that are appropriate for use in adult cohorts, in terms of providing a wide range of response variability and capacity to engage adults’ attention (See Henry, Phillips, Ruffman & Bailey, 2013 for a

review). Taking into account these methodological considerations, I adapted the Strange Stories task developed by White, Hill, Happé and Frith (2009), as this measure has previously been found to be appropriate for use in adult cohorts.

1. 2. False-belief and the Strange Stories tasks as measurements of mindreading

Most work on mindreading research has been done on children. Although a large number of different measures have been used to measure mentalizing in childhood, the most widely used are variants of the False-belief task. Wimmer and Perner (1983) devised this task, which consists of predicting where a character will look for an object in the light of their false belief about the location of a desired object. Basically, they found that five-year-olds are able to understand that a third person will guide their behaviour from their beliefs about a certain state of affairs and not from the situation itself. This way of understanding day-to-day people interaction is a remarkable cognitive achievement because they can appeal to internal mental states to account other observable actions beyond of physical explanations. A robust finding is that typically developing children pass this task between 4- to 5-years-of age (Wellman et al., 2001).

From the outcomes obtained by using False-belief tasks, some researchers have proposed that mind-reading capacity is universal (Avis & Harris, 1991; Callaghan et al., 2005; Liu, Wellman, Tardif & Sabbagh, 2008; Slaughter & Perez-Zapata, 2014) and at least partially automatic (Apperley & Butterfill, 2009; Friedman & Leslie, 2004; Gallagher & Frith, 2003; Sperber & Wilson, 2002). Mentalistic reasoning has been seen not only as a crucial socio-cognitive process to engage efficiently in social situations (Astington, 2003; Saxe & Baron-Cohen, 2006), but also as a fundamental factor to place oneself properly in a given culture (Duffy, Toriyama, Itakura & Kitayama, 2009). Thus, considerable mindreading research has now been focused on investigating the main processes that constitute accurate mind-reading skill (Adams et al., 2010; Wellman et al., 2001) especially the concept of belief.

However, one of the limitations known of the False-Belief task is that it was designed for children, and consequently often produces ceiling effects, particularly in children above the age of six years old (Repacholi & Slaughter, 2003). Consequently, several other measures have been developed that attempt to capture a wider range of mental state reasoning and capture adults'

attention to a greater extent than standard false-belief tasks. One important example is the Strange Stories task designed by Happé (1994) and then revised by White, Hill, Happé and Frith (2009). In this task, participants read stories about social situations that require an understanding of complex mental states such as beliefs and intentions that lead people to engage in white lies or persuasion. For example, in a white lie story, a man tells her aunt that her boots are nice instead of saying what he really thought (that the boots were ugly). Based on this story, participants have to answer the following question: Why does he say that? There are three different kinds of scores. Two points are given for those answers that appeal to sparing the aunt's feelings or reference to telling a white lie; one point is given for those answers that refer to trait characteristics (e.g. he is a nice boy) or relational elements of the situation (e.g. he likes his aunt) without referring to the aunt's feelings. Finally, no score is given for answers related to irrelevant or incorrect facts/feelings (he likes the boots, he wants to trick her). Comparatively, the Strange Stories task is more complex and difficult than the original False-belief task, which captures more variability in mindreading responses, and consequently has sensitivity to detect individual differences in older cohorts. This comparative advantage of the Strange Stories task is vital because it can be used with older children as well as in mindreading research involving adults.

1.3. Background of modulators on adult mindreading research

An emerging body of work has identified modulators of mindreading reasoning. Amongst those highlighted are variables such as social status, self-knowledge, as well as perceptual and conceptual perspective taking. In order to address whether social status affect mindreading reasoning, Rutherford (2004) created higher and lower status minimal groups on the basis of participants' performance in a mock competition. Those participants who won the mock competition were allocated to the high-status group. They acted as instructors and evaluators of the low-status participants who had lost the competition, on a new puzzle task. After this status manipulation, all participants completed individually two mindreading tests. Results showed that those who were in the high-status condition obtained lower mindreading scores than participants in the low-status condition. From Rutherford's point of view, these outcomes revealed that social

status plays a role in the ability to attribute mental states to others, keeping in mind the dynamically changing nature of social status, which varies according to situation.

In addition to social status modulating mindreading reasoning, evidence suggests that privileged knowledge on perspective taking affects mental state attribution. Perspective taking is considered as a vital component on mindreading development (Astington, 1993). For instance, Keysar, Lin and Barr (2003) conducted studies on adults in which a participant's perspective taking was manipulated to be either from their own point of view, or from that of a confederate. Specifically, Keysar and colleagues devised a grid of four rows and columns, where a participant was sat in one side of the table and a director (a confederate) was in the other side. Five slots were occluded so that the director did not have visual access to them, while participants could see the content of all 16 slots. Eight objects were placed in some slots to be moved by participants according to the instructions of the director. In the task, a critical object (e.g., a large glass) was hidden in a paper bag whose content was only known by the participant and not the director. In addition to this object in the paper bag, there were two other similar objects (e.g., a small and a medium glass) placed in different slots, which were seen by both participant and director. One of the director's instructions was to move specific objects. When the director asked participants to move the critical object (e.g., "move the large glass") participants tended to move the object in the paper bag, and not the medium or small sized glass visible to the director. The results showed that when participants have partially different visual access from a protagonist, participants tend to ignore the protagonist's perspective, instead providing responses consistent only with their own particular point of view. This indicates that participants were guided by their own self-perspective, without considering the director's point of view.

In a similar line of research, Birch and Bloom (2007) showed that self-knowledge can influence a conceptual false-belief task. In their experimental paradigm, participants were shown two conditions: informed and ambiguous. In the informed condition, a character (Vicki) stored her violin in a blue container between four containers and leaves the room. Then, a second character (Denise) entered to the room and moved the violin to the red container; in the ambiguous condition, participants were informed only that the violin was moved to another container. Finally, Vicki rearranged the order of all containers in the room. Later on, participants had to provide their

opinion about which container Vicki will look in first. Birch and Bloom's (2007) results revealed that the self-knowledge of the participants influenced their chance judgments, with those in the informed condition assigning a higher probability that Vicki would look in the red container compared to participants in the ambiguous condition, who did not have specific information about the actual location of the violin. Again, this shows that participants' judgements about the behaviour of another are being influenced by their own personal information, and not the information they know the protagonist to have. In both this study and that of Keysar et al. participants' current representations of the physical reality of a situation, influenced their ability to mindread a target. In this thesis, I will ask if broad, culturally-mediated representations of reality also influence the accuracy of participants' mindreading.

Also focused on better understanding modulators of mindreading reasoning, Todd, Hanko, Galinsky and Mussweiler (2011) carried out a set of experiments to test their hypothesis that exposure to targets with similar or different mindsets would influence participants' perspective taking. They argued that whereas priming with similar mindset stimuli activates common self-other characteristics which may lead to confusing self and other perspectives, priming with different mindsets instead triggers distinctive self-referential information that provides a contrasting context and therefore increases the probability of understanding others' perspectives. They argue that a naturalistic situation where these similar and different mindsets are activated occurs when people interact with members from similar or different ethnic groups, respectively. To test their hypothesis, Todd and colleagues adapted Birch and Bloom's (2007) procedure with German characters (e.g., German names and ethnicity) and Turkish characters (e.g., Turkish names and ethnicity), recruiting German participants. They reported that, in the informed condition, participants assigned higher probabilities for German (as opposed to Turkish) targets to look first in the red container and lower probabilities for German versus Turkish targets to look in the blue container. In the ambiguous condition, no significant effects were found. Thus German participants were more accurate in mindreading Turkish targets in the informed condition, presumably because their own knowledge about the location of the violin influenced their mindreading of German targets.

1.4 Cultural experience and perspective taking

The few mindreading studies to date involving adults have concentrated on exploring modulating effects on this critical social cognitive capacity. One potentially important variable is the role of culture, and how different types of cultural information influence mentalistic reasoning. There is evidence that specific cultural experiences influence perspective taking, an ability that is strongly related to mindreading capacity (Astington, 1993). For example, Wu and Keysar (2007) tested undergraduates from either an American or Chinese background in order to find out whether cultural background influences perspective taking. They administered a communicative game in which participants had to judge a director's point of view. The results showed that Chinese participants gave responses that considered the others' perspective significantly more relative to American undergraduates. In addition, Luk et al. (2012) showed that bilingual adults from the United States and China who were primed with typically American or Chinese cultural icons performed differently in a perspective-taking task. Participants in the Chinese prime condition were more accurate at considering the perspective of others than participants who were in the American condition. Luk et al. argued that this result could be explained by appealing to a distinctive activation of cultural knowledge, which would guide a variation in perspective taking reasoning in terms of interdependent or independent view based on Chinese and American prime, respectively.

1.5 Group membership, similarity and mindreading judgments

Besides these modulatory effects on perspective taking, evidence suggests that participants also make differential mental-state attributions depending on cultural categorization, made on the basis of group membership (Demoulin et al., 2004; Leyens, Demoulin, Vaes, Gaunt & Paladino, 2007; Leyens et al., 2000; Paladino et al., 2002; Vaes et al., 2003). To illustrate this effect, Paladino et al. (2002) conducted a set of studies in which participants from two European countries had to assess Spanish/Belgian names vs. North African names. They showed that people were more likely to attribute more complex emotions (i.e. secondary emotions such as empathy and guilt) to same-cultural relative to other-cultural members, regardless of the emotional valence.

Another revealing study about this differential effect in mind-reading ability was carried out by Mitchell, Macrae and Banaji, (2006), who conducted a neuroimaging study using political judgments to match participants with liberal versus conservative points of view. First, participants were shown two target faces accompanied each by a political paragraph. The short story was about a student with liberal socio-political view, while the other story described a student with conservative political views. After learning about these two stories, participants completed a mentalizing task in which they had to judge how likely targets were to agree with different questions. Subsequently, they completed an Implicit Association Test (IAT) in order to measure how similar/dissimilar participants judged themselves with respect to the targets. Mitchell et al. (2006) found that participants made faster affective mentalizing judgments for similar than dissimilar others, which were also associated with distinctive brain regions that are activated when judging in-group (ventral medial prefrontal cortex, mPFC) versus out-group members (dorsal mPFC).

1.6 Cultural targets and mindreading responses

In a similar vein of research, it has been found that mentalizing judgments vary according to whether people think an individual belongs to a certain culture. For instance, Adams et al. (2010) carried out a mentalizing study that aimed to measure behavioural responses and neural regions for mental-state judgments as a function of cultural targets. These authors took into account the distinction suggested by Sabbagh (2004) in mindreading research, that there are at least two independent neural circuits that process mind-reading information, namely, mental-state decoding and mental-state reasoning. The former, 'lower-level' mindreading process decodes information based on observable and available features such as focus of attention, facial expression, tone of voice or eye gaze. Mainly, people are able to infer emotional mental states (e.g., disgusted, interested) from these interpersonal cues. An illustrative task that taps the ability to read these non-verbal cues is the Reading-in-the-Eyes-task (Baron-Cohen, Wheelwright & Jolliffe, 1997). By contrast, 'higher-level' mental-state reasoning involves predicting and explaining people's behaviour in the context of complex, everyday interpersonal situations. This higher-level process involves going beyond external visual cues to make inferences about other people's states of mind

based on their personal history and dispositions, elements of the situation, and so on. An illustrative task for this is inferring a false belief based on a character's misunderstanding of a situation, as in the classical change-location false-belief task or the Strange Stories task (Happé, 1994; White et al., 2009). Following this line of reasoning, Adams et al. (2010) used the Reading-the-Mind-in-the-Eyes task (Baron-Cohen, Wheelwright & Jolliffe, 1997) with Caucasian and Asian targets. They tested Japanese and white American participants to find out whether targets from different cultural backgrounds affect mental-state decoding processes. The results showed that both Japanese and American subjects showed a tendency to give more accurate mentalizing responses to targets that belong to their own relative to a different cultural background. Neuroimaging also showed that there was greater activation in both the bilateral posterior superior temporal sulcus (pSTS) and inferior frontal cortex (IFC) in the same-cultural versus the different-cultural group.

Taking into account the similarity discussion mentioned above, there are, at least, two proposed accounts in order to address this similarity effect on cultural mindreading. Firstly, Savitsky, Keysar, Epley, Carter and Swanson (2011) have proposed that people's communication processes can vary according to whether one is interacting with a close friend or with a stranger. They propose that egocentrism is triggered when people interact with close friends as they find more similarities with themselves relative to strangers. In this particular case, perspective taking is less likely used in friend communications as it is assumed that close friends share common thoughts and experiences. In addition, people may consider carefully a stranger's perspective, due to assumed higher dissimilarity in background assumptions. These effects can be referred to as a closeness-communication bias. A second account has been provided by Apperly (2010), who suggests that interacting with people from different cultural backgrounds can produce difficulties in mindreading alignment, owing to cultural differences in everyday assumptions about what is important in a given situation. On this view, the fact of sharing a common background should facilitate mindreading between members of the same culture, compared to people from a different culture.

The evidence to date appears to support the view that mindreading is facilitated within as opposed to across cultures, but existing studies are limited because they have only assessed

cross-cultural mindreading via blind attributions or simple mental state “decoding.” The current experiments therefore adapted a *higher*-level mindreading task to investigate how complex mental state attributions are affected by a target’s cultural identity. This is important, because it will provide insights into how more complex, deliberative aspects of mindreading might also potentially be influenced by the cultural background of the person with whom we are interacting.

CHAPTER 2: EXPERIMENT 1, AUSTRALIAN VERSUS CROSS-CULTURAL TARGETS

2. Method

2.1 Experiment 1

2.1.1 Participants

One hundred born and raised Australian first-year students (age mean = 19.64 years) at the University of Queensland took part in this study in exchange for course credit. Six non-Australians were allowed to participate for course credit but their data were discarded. As no previous studies have used our methodology, I arbitrarily pre-set the sample size at $N=80$, and then increased the sample to $N=100$ based on the observed effects.



2.1.2 Materials



I adapted the Strange Stories task devised by White et al. (2009). This is a naturalistic mindreading measure that invites complex mental state attributions. Each of the Strange Stories describes a scenario and then poses a test question requiring a causal inference. The task includes two types of stories: Mindreading stories depict interpersonal scenarios including double bluff, white lie, persuasion and misunderstanding. Control stories depict non-social scenarios requiring an understanding of logical relations between statements in the story or an inference about a physical event, but no mindreading. The mindreading and control stories were carefully designed to equate demands associated with text comprehension, integration of information, making inferences from the text and making inferences from implicit information (White et al, 2009).

Our adapted task involved creating matched Australian and Cross-cultural target conditions, for both types of stories. Our adaptations included two main changes: First, I modified the stories to identify the cultural context. The Australian stories described characters, activities and objects from around Australia, and the Cross-cultural stories referenced a variety of cultural contexts. Second, each story was accompanied by a picture that matched the cultural context. In the mindreading conditions, the pictures were faces of Australian or Cross-cultural targets. In the control conditions, the pictures were of the animal or object that was the subject of the story. Table 1 provides examples of the stories. The full set of adapted Strange Stories is available from the authors.

Table 1

Mindreading and Control Story Examples

Target Condition	Mindreading or Control Story	Picture	Story	Test Question	Score Scheme
Australian Target	Mindreading Story Double Bluff		<p>Simon was born and raised in Queensland. He is a larrikin and a liar. Simon's brother Jim knows this, he knows that Simon never tells the truth! Now yesterday Simon stole Jim's cricket bat, and Jim knows Simon has hidden it somewhere, though he can't find it. He's very cross. So he finds Simon and he says, "Where is my bat? You must have hidden it either in the cupboard or under your bed, because I've looked everywhere else. Where is it, in the cupboard or under your bed"? Simon tells him the bat is under his bed.</p>	<p>Why will Jim look in the cupboard for the bat?</p>	<p>2 points—reference to Jim knowing Simon lies.</p> <p>1 point—reference to facts (that's where it really is, Simon's a big liar) or Simon hiding it without reference to implications of lying.</p> <p>0 points—reference to general nonspecific information (because he looked everywhere else).</p>
Chilean Target	Mindreading Story Double Bluff		<p>Rodrigo was born and raised in Valparaiso, Chile. He is a prankster and a liar. Rodrigo's brother Matias knows this, he knows that Rodrigo never tells the truth! Now yesterday Rodrigo stole Matias's soccer shoes, and Matias knows Rodrigo has hidden them somewhere, though he can't find them. He's very cross. So he finds Rodrigo and he says, "Where are my soccer shoes? You must have hidden them either in the cupboard or under your bed, because I've looked everywhere else. Where are they, in the cupboard or under your bed"? Rodrigo tells him the shoes are under his</p>	<p>Why will Matias look in the cupboard for the shoes?</p>	<p>2 points—reference to Matias knowing Rodrigo lies.</p> <p>1 point—reference to facts (that's where it really is, Rodrigo a big liar) or Rodrigo hiding it without reference to implications of lying.</p> <p>0 points—reference to general nonspecific information (because he looked everywhere else).</p>

Australian Target	Control Story		<p>Bruce and Jim are best friends. They both live in Queensland and they are both 10 years old. Bruce has brown hair, green eyes and is over 5 feet tall. Jim looks very different to Bruce. He has blonde hair and blue eyes and he is much smaller than Bruce. Bruce and Jim go on an outing to Dreamworld. They go on lots of rides. For the last ride of the day they decide to go on the Giant Drop. But there is a sign which says: For safety reasons no persons under 5 feet are allowed on.</p>	<p>Why does only Bruce go on the Giant Drop?</p>	<p>2 points—reference to Jim being too short for the ride or Bob being tall enough (Jim's less than 5 feet).</p> <p>1 point—reference to Jim being short or Bob being tall or both; no reference to height in comparison to the limit (Jim's shorter than Bob).</p> <p>0 points—reference to irrelevant or incorrect factors (Jim doesn't like rollercoasters).</p>
Chilean Target	Control Story		<p>Daniel and Cristian are from Santiago, Chile and they are best friends. They are both 10 years old. Daniel has brown hair, white complexion and is over 135 centimetres tall. Cristian looks very different to Daniel. He has black hair and brown skin and he is much smaller than Daniel. Daniel and Cristian go on an outing to Fantasilandia. They go on lots of rides. For the last ride of the day they decide to go on the big rollercoaster. But there is a sign which says: For safety reasons no persons under 135 centimetres are allowed on.</p>	<p>Why does only Daniel go on the rollercoaster?</p>	<p>2 points—reference to Cristian being too short for the ride or Daniel being tall enough (Cristian less than 135 centimetres).</p> <p>1 point—reference to Cristian being short or Daniel being tall or both; no reference to height in comparison to the limit (Cristian's shorter than Daniel).</p> <p>0 points—reference to irrelevant or incorrect factors (Cristian <u>doesn't like</u></p>

2.1.3 Procedure

The procedure was approved by the University's ethical review board and carried out in accordance with the provisions of the World Medical Association Declaration of Helsinki.

Participants were randomly allocated to either the Australian or Cross-cultural condition. In both conditions, they read eight mindreading stories and eight control stories, presented in blocks. The order of block presentation was counterbalanced across participants.

Instructions, stories and test questions were presented on a computer using EPrime software. The instructions stated that participants should read the story on screen, then press "enter" to access the test question. They were further instructed to formulate a response to the test question before pressing "enter" again to access space for typing their answer. They were presented with two practice stories prior to completing the test trials.

Following the detailed criteria provided by White et al (2009), answers to the test questions were scored on a 0 – 2 scale, reflecting accuracy of the response based on the information available in the story. A maximum score of 16 was therefore possible in each of the two conditions (mindreading and control). Additionally, response times were measured as the number of milliseconds between participants' accessing the test question and subsequently accessing the response screen. I hypothesized that this temporal delay reflected the time participants spent in the reasoning process.

Two raters scored each participant's test question responses. One rater was the first author. A second independent assistant who was blinded to experimental design and hypotheses rated a randomly selected 20% of the responses. The intra-class correlation coefficient of .895 indicated excellent reliability for the test question scores.

2.1.4 Results and Discussion

The first step in analysis was to assess participants' test question scores using a mixed-model ANOVA. Story type (mindreading, control) was the within-subjects factor and cultural target (Australian, Cross-cultural) was the between-subjects factor. This analysis revealed a significant interaction, $F(1, 99) = 5.3, p = .024, \eta^2_p = .051$. Follow-up comparisons indicated that mindreading scores were significantly lower when the targets were Cross-cultural ($M = 13.46, SE = .24, 95\%$ confidence interval, or $CI, [12.97, 13.94]$) compared to Australian ($M = 14.24, SE = .21, 95\% CI,$

[13.80, 14.67]), $F(1, 99) = 5.8, p = .018, \eta^2_p = .06$. There was no effect of cultural target on control story scores: Australian ($M = 12.92, SE = .21, 95\% CI, [12.49, 13.34]$) versus Cross-cultural ($M = 13.12, SE = .27, 95\% CI, [12.56, 13.67]$), $F(1, 99) = 0.33, p > .25, \eta^2_p = .003$.

With respect to response time, again, there was a significant interaction between story type and cultural target, $F(1, 99) = 5.1, p = .027, \eta^2_p = .05$. This indicated+ that participants were faster to type their mindreading responses when the targets were Australian ($M = 2504.50, SE = 132.44, 95\% CI, [2238.35, 2770.66]$) as opposed to Cross-cultural ($M = 3007.70, SE = 136.96, 95\% CI, [2732.46, 3282.94]$), $F(1, 99) = 6.98, p = .010, \eta^2_p = .066$. By contrast, no difference in response time was revealed between Australian ($M = 3181.93, SE = 193.80, 95\% CI, [2792.46, 3571.40]$) versus Cross-cultural ($M = 3183.37, SE = 158.24, 95\% CI, [2865.38, 3501.37]$) control stories, $F(1, 99) = 0.00, p > .25, \eta^2_p = .00$.

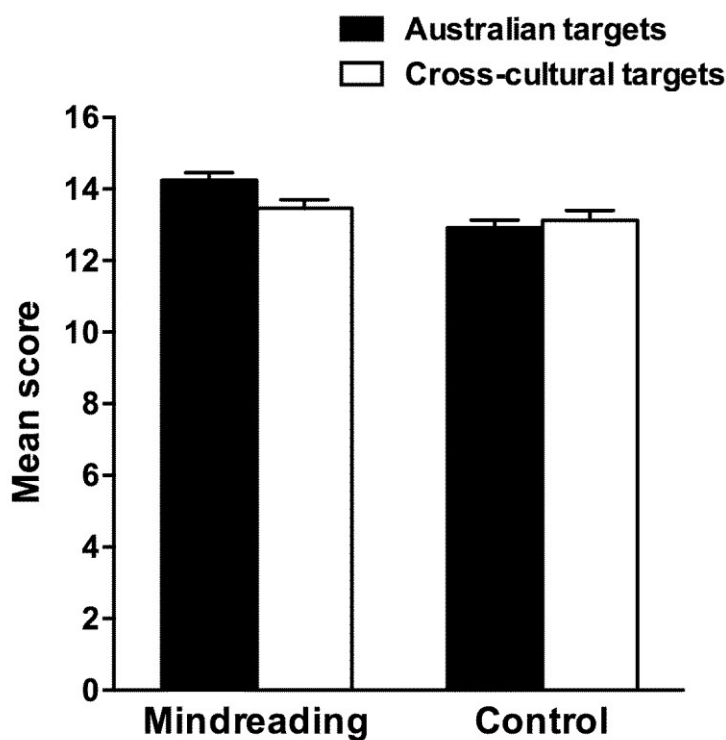


Fig. 1. Mean scores (error bars represent standard errors) for story type.

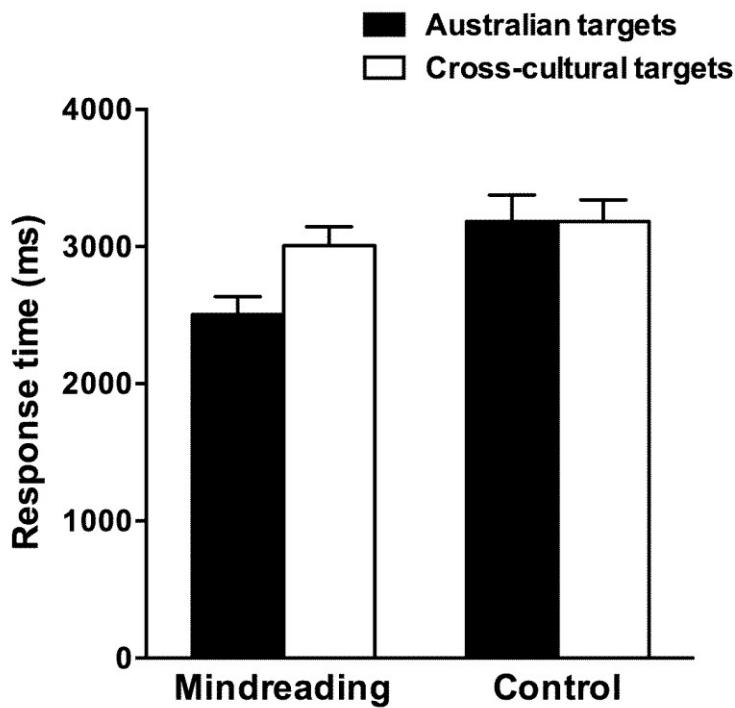


Fig. 2. Mean response times (error bars depict standard errors) for story type.

These results show for the first time that cultural identity of the target influences “higher-level” mindreading. However, a potential confound in this design is that stories in the Australian conditions always described a single cultural context, whereas the Cross-cultural conditions described a variety of cultural contexts. Thus, it is possible that this variability increased the processing demands associated with task completion, and led to the slower response times and lower accuracy seen in the Cross-cultural condition. To address this issue, I conducted a second experiment in which the Australian and the Cross-cultural conditions each described only a single cultural context.

In addition, although Experiment 1 suggests that cross-cultural mindreading may be more challenging than intra-cultural mindreading, in order to draw such a general conclusion, it is important to rule out the possibility that Australians are unique in this regard. Therefore in Experiment 2 I also expanded the study design to include participants from two different cultures. I compared mindreading speed and accuracy when participants made judgements about targets from their own, and from the opposite cultural group.

CHAPTER 3: EXPERIMENT 2, AUSTRALIAN VERSUS CHILEAN TARGETS WITH

AUSTRALIAN AND CHILEAN PARTICIPANTS

3.1 Experiment 2

3.1.1 Participants

Based on the results of our first study, I set the sample size at $N = 100$. However, I ended up testing a higher number of undergraduates in both samples because more of them signed up to the research study webpages than anticipated.

A final sample of 120 native Australian first-year students (age mean = 21.01) from the University of Queensland and 108 native Chilean undergraduate students (age mean = 20.73) from the University of Tarapacá participated in this study in exchange for course credit. Eight non-Australians in the former sample and 6 non-Chileans in the latter were tested and given course credit but their data were discarded. I also discarded six additional Australian and five additional Chilean participants because their response times were greater than three standard deviations from their respective sample means. I decided to use Chilean undergraduates as they maintain a more collectivist cultural background than Australians, who tend to have a more independent background (Oyserman, Coon, & Kemmelmeier, 2002). This collectivist-independent dimension is a key distinction between cultures, providing a strong contrast against which to assess patterns of performance on the mindreading task.

Participants in each country were randomly assigned to either the intra-cultural or cross-cultural condition.

3.1.2 Materials

The task was equivalent to that used in Experiment 1 except that the Cross-cultural stories were replaced with a set of Chilean stories that were matched to the Australian stories. Then, the Australian and Chilean strange stories were translated into Spanish by the first author. The translation was reviewed and approved by a second Spanish native speaker.

3.1.3 Procedure

The procedure was identical to Experiment 1. Inter-rater reliability for the test question scores was very good with intra-class correlation coefficients, based on a random 20% of responses, of .821 for the Australian participants and .812 for the Chilean participants. The

procedure was approved by both universities' ethical review boards.

3.1.4 Results and Discussion

With respect to score results, a mixed-model ANOVA with story type (mindreading, control) as a within-subjects factor and cultural target (Australian, Chilean) and participant culture (Australia, Chile) as between-subjects factors revealed a significant three-way interaction, $F(2, 224) = 11.85, p < .001, \eta^2_p = .050$. Follow-up analyses by participant culture revealed that, amongst Australian participants, mindreading scores were significantly higher in the Australian condition ($M = 14.36, SE = .19, 95\% CI, [13.98, 14.75]$) relative to the Chilean condition ($M = 13.53, SE = .26, 95\% CI, [13.00, 14.05]$), $F(1, 119) = 6.39, p < .012, \eta^2_p = .05$. By contrast for Chilean participants, mindreading scores were significantly higher in the Chilean ($M = 13.14, SE = .24, 95\% CI, [12.64, 13.64]$) relative to Australian condition ($M = 12.37, SE = .28, 95\% CI, [11.78, 12.95]$), $F(1, 107) = 4.13, p = .045, \eta^2_p = .037$. There was no effect of cultural target on control story scores, for either group of participants. For the Australian participants, Australian control story scores ($M = 13.71, SE = .18, 95\% CI, [13.35, 14.08]$) were almost identical to Chilean control story scores ($M = 13.70, SE = .22, 95\% CI, [13.25, 14.14]$), $F(1, 119) = 0.03, p > .25, \eta^2_p = .00$. Similarly, amongst Chilean participants control story scores did not differ by cultural target: Chilean control stories ($M = 11.55, SE = .33, 95\% CI, [10.88, 12.22]$) versus Australian control stories ($M = 11.98, SE = .30, 95\% CI, [11.36, 12.59]$), $F(1, 107) = 0.88, p > .25, \eta^2_p = .00$. Thus the pattern of findings for test response scores confirm an advantage for intra-cultural as opposed to cross-cultural mindreading, for both Australian and Chilean participants.

Considering response times, a 2 (story type) \times 2 (cultural targets) \times 2 (cultural background) mixed-model ANOVA showed a significant three-way interaction, $F(2, 224) = 6.38, p < .012, \eta^2_p = .028$. Amongst Australian participants, mindreading responses were slower in the Chilean condition ($M = 2553.02, SE = 105.62, 95\% CI, [2341.66, 2764.38]$) compared to the Australian condition ($M = 2285.17, SE = 81.68, 95\% CI, [2121.73, 2448.62]$), $F(1, 119) = 4.02, p = .047, \eta^2_p = .033$. However, different from the Australian participants, the interaction between cultural target and story type was not significant for the Chilean participants, $F(1, 107) = 2.65, p = .107, \eta^2_p = .024$. No effects of cultural target on response time were found in the Australian ($M = 2753.32, SE = 143.20, 95\% CI, [2466.76, 3039.87]$) or Chilean ($M = 2650.88, SE = 100.42, 95\% CI, [2449.94, 2851.83]$)

control conditions, $F(1, 119) = 0.34, p > .25, \eta_p^2 = .003$.

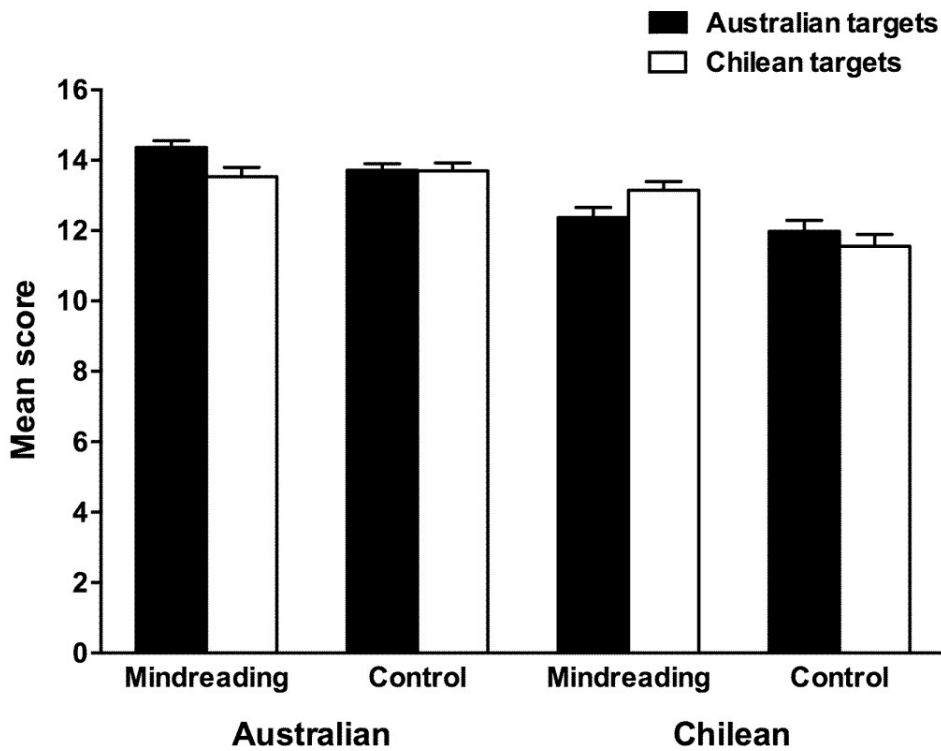


Fig. 3. Mean scores (error bars represent standard errors) for story type according to country of participants (Experiment 2 and 3, respectively).

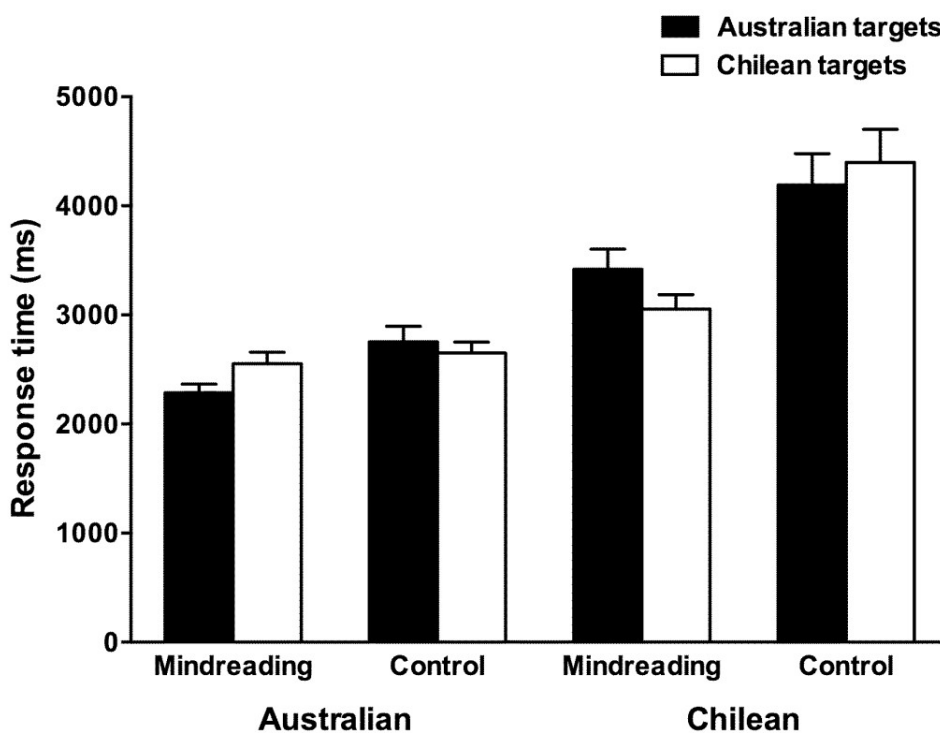


Fig. 4. Mean response times (error bars depict standard errors) for story type according to country of participants (Experiment 2 and 3, respectively).

Experiment 2 confirms that cultural identity of the target moderates mindreading. Specifically, both Australian and Chilean participants made more accurate mental state attributions when mindreading targets from their own versus the other culture.

CHAPTER 4: GENERAL DISCUSSION

These two experiments are the first to demonstrate cultural effects on “higher-level” mindreading. The results showed that, when considering other people from the same cultural background, mindreading is more accurate and generally faster, compared to when considering people from another culture.

Specifically, in both experiments, participants’ mindreading scores were lower when reasoning about cross-cultural relative to intra-cultural targets. This effect was evident amongst Australian participants whether they were reasoning about targets from a variety of different cultures (Experiment 1) or about targets from a single non-Australian culture (Experiment 2). Experiment 2 also demonstrated that this pattern was not unique to Australians, with Chilean participants receiving higher mindreading scores when reasoning about Chilean as opposed to Australian targets. It might be argued that the current results reflect a general difficulty understanding the stories about foreign situations, and not mind-reading of foreigners *per se*. For instance, the use of foreign names and foreign scenarios could potentially have influenced task performance, independent of any more specific influence on mind-reading. Importantly, this explanation seems unlikely given that the control stories also included foreign names and scenarios, yet no effect of culture was observed in either experiment when participants answered questions about the control stories. Thus, participants did not find it generally more difficult to draw inferences about stories depicting cross-cultural actors, objects and places. Rather, it was specifically when asked to engage in mindreading that participants’ performance was influenced by the cultural context.

The pattern of findings on our response time measure indicated that in addition to being lower in accuracy, Australian participants were also slower to formulate mindreading responses about cross-cultural targets. For Chilean participants the overall pattern of responding was similar, but did not attain significance. However, the critical point here is that even though Australian participants took greater time to reason about the mental states of the cross-cultural targets, accuracy was reduced. This implies that the increased difficulty associated with understanding cross-cultural mental states could not be compensated in this sample by allocating greater time (and therefore presumably more effort) to the task.

The present results do not agree with the findings reported by Todd and colleagues (2011), who used an ethnicity-adapted version of Birch and Bloom's (2007) False-belief task. As noted earlier, Todd et al (2011) aimed to overcome the problem of self-knowledge bias in mindreading by presenting targets from a different cultural background. Unlike the findings reported here, they found that German participants were more accurate when mindreading cross-cultural (Turkish) targets, in the informed condition where participants were aware of the true state of affairs. The authors argued that different mindsets are activated in naturalistic settings when interacting with people from different ethnicities, which trigger mental processes that facilitate understanding of dissimilar perspectives. It is important to note that this research involved manipulating what participants explicitly knew about particular situations, and then asking them to provide likelihood estimates of the targets' behaviour. However, real-world multicultural interactions rarely involve this level of certainty and indeed, in the ambiguous condition of Todd et al.'s (2011) Experiment 4, no significant effect of target culture was found. One of the strengths of the culturally adapted task used in the present thesis was that participants reasoned about complex social situations which are inherently ambiguous. Thus under certain circumscribed conditions, self-knowledge may extend to same-culture targets and interfere with accurate mindreading (Todd et al, 2011) but the current results suggest that more commonly, everyday mindreading is facilitated when the participant and target share cultural background.

Our findings align with Adams et al.'s (2010) research on lower-level mindreading. As noted, this study showed that simple mental state attributions based on "eye-reading" are more accurate for intra-cultural relative to cross-cultural targets. This study also showed that the former was accompanied by stronger activation of areas within the "social brain" (Adams et al, 2010). Based on Sabbagh's (2004) functional distinction between lower- and higher-level mindreading, the present set of studies have provided new evidence suggesting that cultural background influences both levels of mindreading processes. Although speculative, it may be that a similar underlying mechanism could account for both sets of findings. Future imaging studies with our adapted Strange Stories are needed to assess this possibility.

It is important to note that the findings presented in the present thesis can be interpreted at least in three different ways. Taking into account Mitchell et al.'s (2006) results, cultural effects on

mindreading can be understood as one example of modulation on the basis of similarity to the target. From this perspective, for people from the same cultural background would be easier and faster to mindread because of their high degree of (cultural) similarity. However, other research suggests that similarity can actually lead to less accurate mindreading, owing to egocentric biases. Savitsky and colleagues (2011) suggest that perspective-taking is relaxed, and therefore less accurate, when interacting with a friend relative to a stranger. Similarly, Todd et al (2011) suggested that their German participants they tended to attribute their own (true) beliefs about the scenarios to German targets who were seen as similar to themselves. In both of these studies, participants had privileged information that may have encouraged the tendency toward egocentrism when reasoning about similar targets, whereas real-world cross-cultural mindreading is likely to involve complex and ambiguous cues, like those described in the Strange Stories. With this in mind, the current findings are most consistent with Apperly's (2010) suggestion that people from the same cultural background share a common understanding of what is relevant in a given situation, which in turn creates a natural interpersonal alignment that facilitates accurate mindreading. Another interpretation is that cultural identity is a distinctive cue that influences mindreading over and above the effect of target similarity. This alternative explanation should be directly contrasted in future studies.

Thus an important possible direction of future investigation is the clarification of whether similar or different brain regions are activated when engaged in higher-level mindreading of same-cultural versus different-cultural members. Specifically, it would be informative to find out whether or not the differential neural effects on higher-level mindreading reasoning are consistent with Mitchell et al.'s (2006) results. Specifically, Mitchell et al. (2006) matched participants according to their political judgements based on two tasks, namely, a mentalizing task and IAT. In the latter test, participants provided responses to match themselves as similar or dissimilar relative to the political point of view held by the assessed targets in the mentalizing task. They found that the ventral mPFC was more strongly associated with judging similar others, whereas the dorsal mPFC was particularly activated when giving mindreading responses to dissimilar others. By using the culturally adapted Strange Stories task with neuroimaging techniques, future studies can provide important insights into whether the ventral

mPFC is similarly more strongly activated when processing same-cultural background members and dorsal mPFC when responding to different cultural members. Such an investigation will provide valuable information into how mindreading modulators are processed at the neural level. Exploring whether these functional distinction on the mPFC are consistent with Mitchell and colleague's results, cultural effects on mindreading may be explained by appealing to in-group versus out-group members. However, whether different brain regions on the mPFC are differentially activated when cultural mindreading is required, there might be distinctive neural mechanisms to process cultural information and group membership.. These rival hypotheses can be contrasted in future studies.

In terms of methodological considerations, the present thesis shows that the culturally adapted version of the Strange Stories task has good sensitivity to the modulatory effects of culture on mindreading reasoning across two different cultural cohorts and languages. This represents an important step forward in this literature, since higher-level mindreading reasoning has relatively few tasks suitable for use in adult populations. Logically, the culturally-adapted version of the Strange Stories task therefore provides a promising measure for future work focused on identifying other modulators of advanced mindreading aspects. Another element to consider in further studies, it is to include assessment of participants' levels of acculturation in order to know how they evaluate themselves as members of their cultural group and to test the extent to which this evaluation is related to cross-cultural mindreading effects.

Finally, from a practical perspective, the results from these two experiments suggest that one reason foreigners may seem 'inscrutable' is because it is relatively difficult to identify what those from another cultural group want, think and feel, and these difficulties emerge even if we allocate greater time to the task. Recognising this, and working to counter it, may help to improve cross-cultural understanding.

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APPENDIX A: CHAPTER 2, EXPERIMENTAL STIMULI

Mindreading Stories

1.1)) Double Bluff: Liar story, Australian target.



Simon was **born and raised in Queensland**. He is a **larrikin and a liar**. Simon's brother Jim knows this, he knows that Simon never tells the truth! Now yesterday Simon stole Jim's **cricket bat**, and Jim knows Simon has hidden it somewhere, though he can't find it. He's very cross. So he finds Simon and he says, "Where is my **bat**? You must have hidden it either in the cupboard or under your bed, because I've looked everywhere else. Where is it, in the cupboard or under your bed"? Simon tells him the **bat** is under his bed.

Q: Why will Jim look in the cupboard for the bat?

- 2 points—reference to Jim knowing Simon lies
- 1 point—reference to facts (that's where it really is, Simon's a big liar) or Simon hiding it without reference to implications of lying
- 0 points—reference to general nonspecific information (because he looked everywhere else)

1.2) Double Bluff: Liar story, Cross-cultural target.



Atsushi was **born and raised in Japan**. He is a **prankster and a liar**. Atsushi's brother Yoshida knows this, he knows that Atsushi never tells the truth! Now yesterday Atsushi stole Yoshida's **kendo sword**, and Yoshida knows Atsushi has hidden it somewhere, though he can't find it. He's very cross. So he finds Atsushi and he says, "Where is my **sword**? You must have hidden it either in the cupboard or under your bed, because I've looked everywhere else. Where is it, in the cupboard or under your bed"? Atsushi tells him the **sword** is under his bed.

Q: Why will Yoshida look in the cupboard for the **sword**?

- 2 points—reference to Yoshida knowing Atsushi lies
- 1 point—reference to facts (that's where it really is, **Atsushi** a big liar) or **Atsushi** hiding it without reference to implications of lying
- 0 points—reference to general nonspecific information (because he looked everywhere else)

2.1) Double Bluff 2: Army story, Australian target.



During the war, the **enemy** army captures an **Australian digger**. They want him to tell them where the **Australian tanks** are; they know they are either by the sea or in the mountains. They know that the **digger** will not want to tell them, he will want to save his army, and so he will certainly lie to them. The **Aussie digger** is very brave and very clever, he will not let them find his tanks. The tanks are really in the mountains. Now when the **enemy** asks him where his tanks are, he says, "They are in the mountains."

Q: Why did the Digger say that?

- 2 points—reference to fact that other army will not believe and hence look in other place, reference to prisoner's realization that that's what they'll do, or reference to double bluff
- 1 point—reference to outcome (to save his army's tanks) or to mislead them
- 0 points—reference to motivation that misses the point of double bluff (he was scared)

2.2) Double Bluff 2: Army story, Cross-cultural target.



During the war, the **Iranian army** captures a member of the **Saudi Arabian army**. They want him to tell them where his **Saudi army's tanks** are; they know they are either by the sea or in the mountains. They know that the **Saudi prisoner** will not want to tell them, he will want to save his army, and so he will certainly lie to them. The **Saudi prisoner** is very brave and very clever, he will not let them find his tanks. The tanks are really in the mountains. Now when the **Iranians** ask him where his tanks are, he says, "They are in the mountains."

Q: Why did the prisoner say that?

- 2 points—reference to fact that **Iranian army** will not believe and hence look in other place, reference to prisoner's realization that that's what they'll do, or reference to double bluff
- 1 point—reference to outcome (to save his army's tanks) or to mislead them
- 0 points—reference to motivation that misses the point of double bluff (he was scared)

3.1)) Persuasion: Greedy Liar story, Australian target.



Brian comes from a large cattle station in Queensland. He is always hungry. Today at school it is his favourite meal—**sausage rolls**. He is a very greedy boy, and he would like to have more **sausage rolls** than anybody else, even though his mother will have made him a lovely meal when he gets home! But everyone is allowed two **sausage rolls** and no more. When it is Brian's turn to be served, he says, "Oh, please can I have four **sausage rolls**, because I won't be having any dinner when I get home!"

Q: Why does Brian say this?

- 2 points—reference to fact that he's trying to elicit sympathy, being deceptive
- 1 point—reference to his state (greedy), outcome (to get more sausages) or factual
- 0 points—reference to a motivation that misses the point of sympathy elicitation/deception, or factually incorrect

3.2)) Persuasion: Greedy Liar story, Cross-cultural target.



Dmitry comes from a large city in Russia. He is always hungry. Today at school it is his favourite meal—**borshch soup**. He is a very greedy boy, and he would like to have more **borshch** than anybody else, even though his mother will have made him a lovely meal when he gets home! But everyone is allowed **one bowl of borshch** and no more. When it is Dmitry's turn to be served, he says, "Oh, please can I have **two bowls**, because I won't be having any dinner when I get home!"

Q: Why does Dmitry say this?

- 2 points—reference to fact that he’s trying to elicit sympathy, being deceptive
- 1 point—reference to his state (greedy), outcome (to get more borshch) or factual
- 0 points—reference to a motivation that misses the point of sympathy elicitation/deception, or factually incorrect

4.1)) Persuasion 2: Kitten story, Australian target.



Jill was born and raised in Sydney. She really wanted to buy a **Blue Heeler puppy**, so she went to see Mrs. Smith, who had lots of **puppies** she didn’t want. Now Mrs. Smith loved the **pups**, and she wouldn’t do anything to harm them, though she couldn’t keep them all herself. When Jill visited she wasn’t sure she wanted one of Mrs. Smith’s **puppies**, since they were all males and she had wanted a female. But Mrs. Smith said, “If no one buys the **puppies** I’ll just have to drown them!”

Q: Why did Mrs. Smith say that?

- 2 points—reference to persuasion, manipulating feelings, trying to induce guilt/pity
- 1 point—reference to outcome (to sell them or get rid of them in a way which implies not drowning) or simple motivation (to make Jill sad)
- 0 points—reference to general knowledge or dilemma without realization that the statement was not true (she’s a horrible woman)

4.2)) Persuasion 2: chinchilla story, Cross-cultural target.



Maria was born and raised in Peru. Maria wanted to buy a **chinchilla kit**, so she went to see Mrs. Quispe, who had lots of **chinchilla kits** she didn’t want. Now Mrs. Quispe loved the **kits**, and she wouldn’t do anything to harm them, though she couldn’t keep them all herself. When Maria visited she wasn’t sure she wanted one of Mrs. Quispe’s **kits**, since they were all males and she had wanted a female. But Mrs. Quispe said, “If no one buys the **kits** I’ll just have to drown them!”

Q: Why did Mrs. Quispe say that?

- 2 points—reference to persuasion, manipulating feelings, trying to induce guilt/pity
- 1 point—reference to outcome (to sell them or get rid of them in a way which implies not drowning) or simple motivation (to make Catalina sad)
- 0 points—reference to general knowledge or dilemma without realization that the statement was not true (she's a horrible woman)

5.1)) White Lie: Ugly ugg boots story, Australian target.



One day Aunt Jane came to visit Peter **at his home in Brisbane**. Now Peter loves his aunt very much, but today she is wearing a pair of **Ugg boots**; which Peter thinks are very ugly indeed. Peter thinks his aunt looks silly **in them**, and much nicer in her old **boots**. But when Aunt Jane asks Peter, “How do you like my new **Uggs?**,” Peter says, “Oh, they’re very nice.”

Q: Why does he say that?

- 2 points—reference to white lie or wanting to spare her feelings; some implication that this is for aunt’s benefit rather than just for his, desire to avoid rudeness or insult
- 1 point—reference to trait (he’s a nice boy) or relationship (he likes his aunt); purely motivational (so she won’t shout at him) with no reference to aunt’s thoughts or feelings; incomplete explanation (he’s lying, he’s pretending).
- 0 points—reference to irrelevant or incorrect facts/feelings (he likes the hat, he wants to trick her)

5.2)) White Lie: Ugly dress story, Cross-cultural target.



One day Aunt Xiaoyan came to visit Ji **at his house in Beijing**. Now Ji loves his aunt very much, but today she is wearing a new **green cheongsam dress**, which Ji thinks is very ugly indeed. Ji thinks his aunt looks silly **in it**, and much nicer in her old **red cheongsam**. But when Aunt Xiaoyan asks Ji, “How do you like my new **cheongsam?**” Ji says, “Oh, its very nice.”

Q: Why does he say that?

- 2 points—reference to white lie or wanting to spare her feelings; some implication that this is for aunt's benefit rather than just for his, desire to avoid rudeness or insult
- 1 point—reference to trait (he's a nice boy) or relationship (he likes his aunt); purely motivational (so she won't shout at him) with no reference to aunt's thoughts or feelings; incomplete explanation (he's lying, he's pretending).
- 0 points—reference to irrelevant or incorrect facts/feelings (he likes the hat, he wants to trick her)

6.1)) White Lie 2: Guinea pig story, Australian target.



Helen was born and raised in Tasmania. She waited all year for Christmas, because she knew at Christmas she could ask her parents for a **guinea pig**. Helen wanted a **guinea pig** more than anything in the world. At last Christmas Day arrived, and Helen ran to unwrap the big box her parents had given her. She felt sure it would contain a little **guinea pig** in a cage. But when she opened it, with all the family standing round, she found her present was just a boring old set of **educational videos**, which Helen did not want at all! Still, when Helen's parents asked her how she liked her Christmas present, she said, "It's lovely, thank you. It's just what I wanted."

Q: Why did she say this?

- 2 points—reference to white lie or wanting to spare their feelings; some implication that this is for parent's benefit rather than just for her, desire to avoid rudeness or insult
- 1 point—reference to trait (she's a nice girl) or relationship (she likes her parents); purely motivational (so they won't shout at her) with no reference to parent's thoughts or feelings; incomplete explanation (she's lying, she's pretending)
- 0 points—reference to irrelevant or incorrect facts/feelings (she likes the present, she wants to trick them)

6.2)) White Lie 2: Pet cuy story, Cross-cultural target.



Paula was born and raised in Brazil. Paula waited all year for Christmas, because she knew at Christmas she could ask her parents for a **pet cuy**. Paula wanted a **cuy** more than anything in the world. At last Christmas Day arrived, and Paula ran to unwrap the big box her parents had given her. She felt sure it would contain a little **cuy** in a cage. But when she opened it, with all the family standing round, she found her present was just a boring old **coloring book**, which Paula did not want at all! Still, when Paula's parents asked her how she liked her Christmas present, she said, "It's lovely, thank you. It's just what I wanted."

Q: Why did she say this?

- 2 points—reference to white lie or wanting to spare their feelings; some implication that this is for parent's benefit rather than just for her, desire to avoid rudeness or insult
- 1 point—reference to trait (she's a nice girl) or relationship (she likes her parents); purely motivational (so they won't shout at her) with no reference to parent's thoughts or feelings; incomplete explanation (she's lying, she's pretending)
- 0 points—reference to irrelevant or incorrect facts/feelings (she likes the present, she wants to trick them)

7.1) Misunderstanding: Fearful woman story, Australian target.



Late one night old Mrs. Peabody is walking home **along the Esplanade in Townsville, Queensland**. She doesn't like walking home alone in the dark because she is always afraid that someone will attack her and rob her. She really is a very nervous person! Suddenly, from behind a **palm tree** comes a man. He wants to ask Mrs. Peabody what time it is, so he walks toward her. When Mrs. Peabody sees the man coming toward her, she starts to tremble and says, "Take my purse, just don't hurt me please!"

Q: Why did she say that?

- 2 points—reference to her belief that he was going to mug her or her ignorance of his real intention
- 1 point—reference to her trait (she's nervous) or state (she's scared) or intention (so he wouldn't hurt her) without suggestion that fear was unnecessary
- 0 points—factually incorrect/irrelevant answers; reference to the man actually intending to attack her

7.2) Misunderstanding: Fearful woman story, Cross-cultural target.

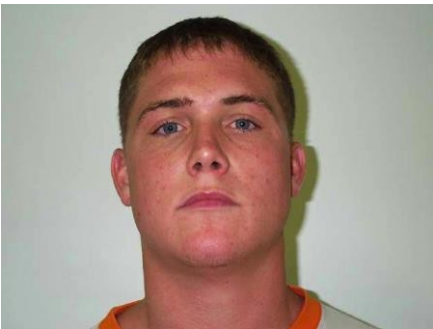


Late one night old Mrs. Abayomi is walking home **along a downtown street in Abuya, Nigeria**. She doesn't like walking home alone in the dark because she is always afraid that someone will attack her and rob her. She really is a very nervous person! Suddenly, from behind an **iroko tree** comes a man. He wants to ask Mrs. Abayomi what time it is, so he walks toward her. When Mrs. Abayomi sees the man coming toward her, she starts to tremble and says, "Take my purse, just don't hurt me please!"

Q: Why did she say that?

- 2 points—reference to her belief that he was going to mug her or her ignorance of his real intention
- 1 point—reference to her trait (she's nervous) or state (she's scared) or intention (so he wouldn't hurt her) without suggestion that fear was unnecessary
- 0 points—factually incorrect/irrelevant answers; reference to the man actually intending to attack her

8.1) Misunderstanding 2: Burglar story, Australian target.



A burglar who has just robbed a **downtown Brisbane** shop is making his getaway. As he is running home, a **mounted policeman** sees him drop his **sunglasses**. He doesn't know the man is a burglar, he just wants to tell him he dropped his **sunnies**. But when the policeman shouts out to the burglar, "Hey, you! Stop!," the burglar turns round, sees the policeman and gives himself up. He puts his hands up and admits that he did the break-in at the local shop.

Q: Why did the burglar do that?

- 2 points—reference to belief that policeman knew that he'd burgled the shop
- 1 point—reference to something factually correct in story
- 0 points—factually incorrect/irrelevant answers

8.2) Misunderstanding 2: Burglar story, Cross-cultural target.



A burglar who has just robbed a **Bombay market** is making his getaway. As he is running home, a **policeman** on his beat sees him drop his **sunglasses**. He doesn't know the man is a burglar, he just wants to tell him he dropped his **glasses**. But when the policeman shouts out to the burglar, "Hey, you! Stop!," the burglar turns round, sees the policeman and gives himself up. He puts his hands up and admits that he did the theft at the local market.

Q: Why did the burglar do that?

- 2 points—reference to belief that policeman knew that he'd burgled the shop
- 1 point—reference to something factually correct in story
- 0 points—factually incorrect/irrelevant answers

Control Stories

1.1)) Rollercoaster, Australian story



Bruce and **Jim** are best friends. They both live in **Queensland** and they are both 10 years old. Bruce has **brown hair, green eyes** and **is over 5 feet tall**. Jim looks very different to Bob. He has **blonde hair and blue eyes** and he is much smaller than Bob. Bob and Jim go on an outing to **Dreamworld**. They go on lots of rides. For the last ride of the day they decide to go on the **Giant Drop**. But there is a sign which says: For safety reasons no persons **under 5 feet** are allowed on.

Q: Why does only Bruce go on the **Giant Drop**?

- 2 points—reference to Jim being too short for the ride or Bob being tall enough (Jim's less than 5 feet)

- 1 point—reference to Jim being short or Bob being tall or both; no reference to height in comparison to the limit (Jim's shorter than Bob)
- 0 points—reference to irrelevant or incorrect factors (Jim doesn't like rollercoasters)

1.2)) Rollercoaster, Cross-cultural story



Sergio and Jose are from **Brazil** and they are best friends. They are both 10 years old. Sergio has **brown hair, white complexion** and is over **135 centimetres** tall. Jose looks very different to Sergio. He has **black hair and brown skin** and he is much smaller than Sergio. Sergio and Jose go on an outing **to the fun fair**. They go on lots of rides. For the last ride of the day they decide to go on the **big rollercoaster**. But there is a sign which says: For safety reasons no persons under **135 centimetres** are allowed on.

Q: Why does only Bob go on the rollercoaster?

- 2 points—reference to Jose being too short for the ride or Sergio being tall enough (Jose's less than 5 feet)
- 1 point—reference to Jose being short or Sergio being tall or both; no reference to height in comparison to the limit (Jim's shorter than Bob)
- 0 points—reference to irrelevant or incorrect factors (Jose doesn't like rollercoasters)

2.1)) Skiing, Australia story



Joe has never been **skiing** before and is looking forward to his first **skiing holiday this winter in New Zealand**. All his **gear** for the holiday has been well prepared; his mum has bought him a pair of goggles and she has thoroughly waxed and polished the **bottoms of his skis** to protect them. On the first day of Joe's holiday his **skis keep slipping from underneath him**, making him fall over into the snow.

Q: Why does Rupert keep falling over?

- 2 points—reference to Rupert's Mum having waxed the skis, making them slippery
- 1 point—reference to Rupert's never having skied before
- 0 points—reference to irrelevant or incorrect factors (his skis are loose)

2.2) Sandboard, Cross-cultural story



Guillermo has never practiced **sandboarding** before and is looking forward to his first **sandboarding holiday this summer in the desert of Chile**. All his kit for the holiday has been well prepared; his mum has bought him a pair of goggles and she has thoroughly **polished his board** and **loosened the foot strap**. On the first day of Guillermo's holiday **his feet kept slipping off the board**, making him fall over into the sand.

Q: Why does Guillermo keep falling over?

- 2 points—reference to Guillermo's Mum having **loosened the foot strap**, making it **unsafe**.
- 1 point—reference to Guillermo's never having ridden on sand board before
- 0 points—reference to irrelevant or incorrect factors (goggles, etc.)

3.1)) Huddling animals, Australian story



Emperor penguins live in Antarctica, where it is **extremely cold**. There is always snow on the ground and ice on the surface of the sea. **Emperor penguins** can often be found standing clumped together in huge, huddled masses. Every few minutes, a penguin in the middle of the huddle moves to the edge of the huddle, changing places with one of the **penguins** on the outside of the group.

Q: Why do the penguins keep changing places?

- 2 points—reference to the middle penguin being the warmest or to taking turns at being warm
- 1 point—reference to keeping warm without relating this to the huddle

- 0 points—reference to irrelevant or incorrect factors

3.2)) Huddling animals, Cross-cultural story



Caribou live in Alaska, where there are many insects in summer. There are flies and mosquitos that harass the caribou all day long. Caribou can often be found standing clumped together in huge, huddled masses. Every few minutes, a **caribou** in the middle of the huddle moves to the edge of the huddle, changing places with one of the **caribou** on the outside of the group.

Q: Why do the caribou keep changing places?

- 2 points—reference to the middle caribou being the protected from the insets or to taking turns at being protected
- 1 point—reference to insect protection without relating this to the huddle
- 0 points—reference to irrelevant or incorrect factors

4.1)) Snake, Australian story



Snakes are remarkable animals. They have very stretchy skin, which they shed once a year and can also separate their upper and lower jaws and open their mouths really wide. The **Carpet python** is an example of a very large snake. One **evening, a possum climbs up a tree, where a Carpet python is resting, after a day sunbaking. The next day**, the snake is lying on the ground with a huge bulge in its middle. The **possum** however is nowhere to be seen.

Q: Where is the **possum**?

- 2 points—reference to the snake having eaten the possum (in the snake's tummy)
- 1 point—reference to the possum having been eaten or being dead without reference to the snake
- 0 points—reference to irrelevant or incorrect factors

4.2) Snake, Cross-cultural story



Snakes are remarkable animals. They have very stretchy skin, which they shed once a year and can also separate their upper and lower jaws and open their mouths really wide. The **South American anaconda** is an example of a very large snake. **One day, a deer gallops under a tree, from which an anaconda is hanging, as it makes its way toward a lake.** Later that day, the snake is lying on the ground with a huge bulge in its middle. The **deer** however is nowhere to be seen.

Q: Where is the deer?

- 2 points—reference to the snake having eaten the deer (in the snake's tummy)
- 1 point—reference to the deer having been eaten or being dead without reference to the snake
- 0 points—reference to irrelevant or incorrect factors

5.1) Hunter animal, Australian story



Dingos are fierce hunters. They can run as fast as a car when they are young and fit but they get very slow and weak when they are old. One very hot day, an old and hungry **dingo** is standing at the top of a hill, watching a **herd of rabbits** moving across bushland. When the rabbits have passed by, the **dingo** begins to chase a **small rabbit** at the back of the herd. One by one, the **rabbits** nimbly jump across a ditch. But the Dingo returns to the cave, still hungry.

Q: Why is dingo still hungry?

- 2 points—reference to the dingo being old or slow or weak and so not being able to catch the rabbits (he was too old and weak to jump over the river)
- 1 point—reference to the dingo being unable to catch the rabbits without reference to him being old or slow or weak (he couldn't jump across the river to catch the rabbits)
- 0 points—reference to irrelevant or incorrect factors

5.2)) Hunter animal, Cross-cultural story



Lions are fierce hunters. They can run as fast as a car when they are young and fit but they get very slow and weak when they are old. One very hot day, an old and hungry **lion** is standing at the mouth of a cave, watching a **herd of zebras** moving across a large open plain. When the herd has passed by, the **lion** begins to chase a **small zebra** at the back of the herd. One by one, the **zebras** nimbly jump across a river. But the lion returns to the cave, still hungry.

Q: Why is the lion still hungry?

- 2 points—reference to the lion being old or slow or weak and so not being able to catch the zebras (he was too old and weak to jump over the river)
- 1 point—reference to the lion being unable to catch the zebras without reference to him being old or slow or weak (he couldn't jump across the river to catch the zebras)
- 0 points—reference to irrelevant or incorrect factors

6.1)) Burglar, Australian story



An **Aussie** burglar is about to break into a jewelers' shop in **Queen Street**. He skillfully picks the lock on the shop door. Carefully he steps over the electronic detector beam. If he breaks this beam it will set off the alarm. Quietly he opens the door of the storeroom and sees the **opals** glittering. As he reaches out, however, he steps on something soft. He hears a screech of a **possum** runs out past him, toward the shop door. Immediately the alarmsounds.

Q: Why did the alarm go off?

- 2 points—reference to animal which the burglar disturbed setting off alarm by crossing beam (type of animal unimportant)
- 1 point—reference to burglar setting off alarm (he was startled by the animal so crossed the beam); reference to animal setting off alarm without explaining it crossed the beam (he trod on a cat and it set off the alarm)
- 0 points—reference to irrelevant or incorrect factors (the animal's screech set off the alarm); alternative reasons for alarm going off (a security camera saw him and set the alarm off)

6.2)) Burglar, Cross-cultural story



An **Afghan** burglar is about to break into a jewelers' shop in **Kabul, Afghanistan**. He skillfully picks the lock on the shop door. Carefully he steps over the electronic detector beam. If he breaks this beam it will set off the alarm. Quietly he opens the door of the storeroom and sees the **lapis lazuli** glittering. As he reaches out, however, he steps on something soft. He hears a screech of an **Afghan squirrel** runs out past him, toward the shop door. Immediately the alarm sounds.

Q: Why did the alarm go off?

- 2 points—reference to animal which the burglar disturbed setting off alarm by crossing beam (type of animal unimportant)
- 1 point—reference to burglar setting off alarm (he was startled by the animal so crossed the beam); reference to animal setting off alarm without explaining it crossed the beam (he trod on a cat and it set off the alarm)
- 0 points—reference to irrelevant or incorrect factors (the animal's screech set off the alarm); alternative reasons for alarm going off (a security camera saw him and set the alarm off)

7.1) Meeting , Australian story



Alison is going shopping. She needs **six lamingtons** for her meeting. She goes from the bakery department to the **woollies**. In the bakery department she finds that there are two brands of **lamingtons** of the right kind. **Tasty**

lamingtons cost less in single packs than **grandma lamingtons**. However, only **grandma lamingtons** come in multipacks of twenty. Alison buys the multipack, even though she only needs six lamingtons.

Q: Why does Alison buy the multipack of *grandma lamingtons*?

- 2 points—reference to saving money by buying the multipack
- 1 point—reference to convenience of having more lamingtons, or future need for more lamingtons; no mention of saving money
- 0 points—reference to irrelevant or incorrect factors (Delicious lamingtons are taster)

7.2) Meeting, Cross-cultural story



Anjali is going shopping. She needs **six cardamom cakes** for her meeting. She goes from the bakery department to the **Indian market**. In the bakery department she finds that there are two brands of **cardamom cake** of the right kind. **Tasty cardamom** cost less in single packs than **grandma cardamom**. However, only **grandma cardamom** come in multipacks of twenty. Anjali buys the multipack, even though she only needs six lamingtons.

Q: Why does Alison buy the multipack of *grandma cardamom*?

- 2 points—reference to saving money by buying the multipack
- 1 point—reference to convenience of having more cardamom cakes, or future need for more cardamom cakes; no mention of saving money
- 0 points—reference to irrelevant or incorrect factors (grandma cardamom are taster)

8.1) Rock fall, Australian story



In **storm season** rocks often fall from the top of mountains. One day on **Mount Kosciuszko in New South Wales**, a very large boulder becomes loose and starts rolling down the mountain. It rolls and rolls and rolls, gathering speed and spinning and bouncing off the mountain side. Suddenly, there is a very noisy splash.

Q: Why is there a loud splash?

- 2 points—reference to the boulder falling into water to make the splash (the boulder must have fallen into a lake)
- 1 point—reference to water without reference to the boulder (there was a pool at the bottom of the mountain)
- 0 points—reference to irrelevant or incorrect factors (it's very big so it's very noisy)

8.2) Rock fall, Cross-cultural story



In **stormy weather**, rocks often fall from the top of mountains. One day on **Mt. Aconcagua in the Andes**, a very large boulder becomes loose and starts rolling down the mountain. It rolls and rolls and rolls, gathering speed and spinning and bouncing off the mountain side. Suddenly, there is a very noisy splash.

Q: Why is there a loud splash?

- 2 points—reference to the boulder falling into water to make the splash (the boulder must have fallen into a lake)
- 1 point—reference to water without reference to the boulder (there was a pool at the bottom of the mountain)
- 0 points—reference to irrelevant or incorrect factors (it's very big so it's very no

APPENDIX B: CHAPTER 3, EXPERIMENTAL STIMULI, THE STRANGE STORIES TASK ENGLISH VERSION

Mindreading Stories

1.) Double Bluff: Liar story, Chilean target.



Rodrigo **was born and raised in Valparaiso, Chile**. He is a **prankster and a liar**. Rodrigo's brother Matias knows this, he knows that Rodrigo never tells the truth! Now yesterday Rodrigo stole Matias's **soccer shoes**, and Matias knows Rodrigo has hidden it somewhere, though he can't find it. He's very cross. So he finds Rodrigo and he says, "Where are my **soccer shoes**? You must have hidden it either in the cupboard or under your bed, because I've looked everywhere else. Where is it, in the cupboard or under your bed?" Rodrigo tells him the **shoes** are under his bed.

Q: Why will Matias look in the cupboard for the **shoes**?

- 2 points—reference to Matias knowing Rodrigo lies
- 1 point—reference to facts (that's where it really is, **Rodrigo** a big liar) or **Rodrigo** hiding it without reference to implications of lying
- 0 points—reference to general nonspecific information (because he looked everywhere else)

2.) Double Bluff 2: Army story, Chilean target.



During the war, the **enemy army** captures a member of the **Chilean army**. They want him to tell them where his **Chilean army's tanks** are; they know they are either by the sea or in the mountains. They know that the **Chilean prisoner** will not want to tell them, he will want to save his army, and so he will certainly lie to them. The **Chilean prisoner** is very brave and very clever, he will not let them find his tanks. The tanks are really in the mountains. Now when the **enemy** ask him where his tanks are, he says, "They are in the mountains."

Q: Why did the Chilean prisoner say that?

- 2 points—reference to fact that **enemy army** will not believe and hence look in other place, reference to prisoner's realization that that's what they'll do, or reference to double bluff
- 1 point—reference to outcome (to save his army's tanks) or to mislead them
- 0 points—reference to motivation that misses the point of double bluff (he was scared)

3.) Persuasion: Greedy Liar story, Chilean target.



Felipe comes from Chillan, a countryside city in Chile. He is always hungry. Today at school it is his favourite meal—**cazuela soup**. He is a very greedy boy, and he would like to have more **cazuela** than anybody else, even though his mother will have made him a lovely meal when he gets home! But everyone is allowed **one bowl of cazuela** and no more. When it is Felipe's turn to be served, he says, "Oh, please can I have **two bowls**, because I won't be having any dinner when I get home!"

Q: Why does Felipe say this?

- 2 points—reference to fact that he's trying to elicit sympathy, being deceptive
- 1 point—reference to his state (greedy), outcome (to get more borshch) or factual
- 0 points—reference to a motivation that misses the point of sympathy elicitation/deception, or factually incorrect

4.) Persuasion 2: puppies story, Chilean target.



Paulina was born and raised in Santiago, Chile. Maria wanted to buy a **Labrador puppy**, so she went to see Mrs. Gonzalez, who had lots of **Labrador puppies** she didn't want. Now Mrs. Gonzalez loved the **puppies**, and she wouldn't

do anything to harm them, though she couldn't keep them all herself. When Maria visited she wasn't sure she wanted one of Mrs. Gonzalez's **puppies**, since they were all males and she had wanted a female. But Mrs. Gonzalez said, "If no one buys the **puppies** I'll just have to drown them!"

Q: Why did Mrs. Gonzalez say that?

- 2 points—reference to persuasion, manipulating feelings, trying to induce guilt/pity
- 1 point—reference to outcome (to sell them or get rid of them in a way which implies not drowning) or simple motivation (to make Catalina sad)
- 0 points—reference to general knowledge or dilemma without realization that the statement was not true (she's a horrible woman)

5.) White Lie: Ugly dress story, Chilean target.



One day Aunt Alejandra came to visit Martin **at his house in Concepcion, Chile**. Now Martin loves his aunt very much, but today she is wearing a new **typical Chilean dress**, which Martin thinks is very ugly indeed. Martin thinks his aunt looks silly in **it**, and much nicer in her old **dress**. But when Aunt Alejandra asks Martin, "How do you like my new **dress**?" Martin says, "Oh, it's very nice."

Q: Why does he say that?

- 2 points—reference to white lie or wanting to spare her feelings; some implication that this is for aunt's benefit rather than just for his, desire to avoid rudeness or insult
- 1 point—reference to trait (he's a nice boy) or relationship (he likes his aunt); purely motivational (so she won't shout at him) with no reference to aunt's thoughts or feelings; incomplete explanation (he's lying, he's pretending).
- 0 points—reference to irrelevant or incorrect facts/feelings (he likes the hat, he wants to trick her)

6.2) White Lie 2: Hamster story, Chilean target.



Karina was born and raised in Antofagasta, Chile. Karina waited all year for Christmas, because she knew at Christmas she could ask her parents for a **little hamster**. Paula wanted a **hamster** more than anything in the world. At last Christmas Day arrived, and Karina ran to unwrap the big box her parents had given her. She felt sure it would contain a little **hamster** in a cage. But when she opened it, with all the family standing round, she found her present was just a **sock packages**, which Paula did not want at all! Still, when Paula's parents asked her how she liked her Christmas present, she said, "It's lovely, thank you. It's just what I wanted."

Q: Why did she say this?

- 2 points—reference to white lie or wanting to spare their feelings; some implication that this is for parent's benefit rather than just for her, desire to avoid rudeness or insult
- 1 point—reference to trait (she's a nice girl) or relationship (she likes her parents); purely motivational (so they won't shout at her) with no reference to parent's thoughts or feelings; incomplete explanation (she's lying, she's pretending)
- 0 points—reference to irrelevant or incorrect facts/feelings (she likes the present, she wants to trick them)

7.) Misunderstanding: Fearful woman story, Chilean target.



Late one night old Mrs. Rodriguez is walking home **along a downtown street in Arica, Chile**. She doesn't like walking home alone in the dark because she is always afraid that someone will attack her and rob her. She really is a very nervous person! Suddenly, from behind a **palm tree** comes a man. He wants to ask Mrs. Rodriguez what time it is, so he walks toward her. When Mrs. Rodriguez sees the man coming toward her, she starts to tremble and says, "Take my purse, just don't hurt me please!"

Q: Why did she say that?

- 2 points—reference to her belief that he was going to mug her or her ignorance of his real intention
- 1 point—reference to her trait (she's nervous) or state (she's scared) or intention (so he wouldn't hurt her) without suggestion that fear was unnecessary
- 0 points—factually incorrect/irrelevant answers; reference to the man actually intending to attack her

8.) Misunderstanding 2: Burglar story, Chilean target.



A burglar who has just robbed a **handcrafted market** in Temuco (Chile) is making his getaway. As he is running home, a mounted **policeman** on his beat sees him drop his **sunglasses**. He doesn't know the man is a burglar, he just wants to tell him he dropped his **glasses**. But when the policeman shouts out to the burglar, "Hey, you! Stop!," the burglar turns round, sees the policeman and gives himself up. He puts his hands up and admits that he did the theft at the local market.

Q: Why did the burglar do that?

- 2 points—reference to belief that policeman knew that he'd burgled the shop
- 1 point—reference to something factually correct in story
- 0 points—factually incorrect/irrelevant answers.

Chilean Control Stories

1) Rollercoaster, Chilean culture



Daniel and **Cristian** are from **Santiago (Chile)** and they are best friends. They are both 10 years old. Sergio has **brown hair, white complexion** and is over **135 centimetres** tall. Jose looks very different to Sergio. He has **black hair and brown skin** and he is much smaller than Daniel. Daniel and Cristian go on an outing to **Fantasilandia (a fun fair)**. They go on lots of rides. For the last ride of the day they decide to go on the **big rollercoaster**. But there is a sign which says: For safety reasons no persons under **135 centimetres** are allowed on.

Q: Why does only Daniel go on the rollercoaster?

- 2 points—reference to Cristian being too short for the ride or Daniel being tall enough (Cristian's less than 5 feet)

- 1 point—reference to Cristian being short or Daniel being tall or both; no reference to height in comparison to the limit (Cristian's shorter than Daniel)
- 0 points—reference to irrelevant or incorrect factors (Jose doesn't like rollercoasters).

2) Sandboarding, Chilean Culture



Guillermo has never practiced **sandboarding** before and is looking forward to his first **sandboarding holiday this summer in the desert of Chile**. All his kit for the holiday has been well prepared; his mum has bought him a pair of goggles and she has thoroughly **polished his board** and **loosened the foot strap**. On the first day of Guillermo's holiday **his feet kept slipping off the board**, making him fall over into the sand.

Q: Why does Guillermo keep falling over?

- 2 points—reference to Guillermo's Mum having **loosened the foot strap**, making it **unsafe**.
- 1 point—reference to Guillermo's never having ridden on sand board before
- 0 points—reference to irrelevant or incorrect factors (goggles, etc.)

3) Huddling animals, Chilean Culture



Huemuls live in the south of Chile, where there are many insects in summer. There are flies and mosquitos that harass the huemuls all day long. huemuls can often be found standing clumped together in huge, huddled masses. Every few minutes, a **huemul** in the middle of the huddle moves to the edge of the huddle, changing places with one of the **huemul** on the outside of the group.

Q: Why do the huemul keep changing places?

- 2 points—reference to the middle huemul being the protected from the insets or to taking turns at being protected
- 1 point—reference to insect protection without relating this to the huddle
- 0 points—reference to irrelevant or incorrect factors

4) Snake, Chilean Culture



Snakes are remarkable animals. They have very stretchy skin, which they shed once a year and can also separate their upper and lower jaws and open their mouths really wide. The long tail **sneak** is an example of a snake. **One day, a rodent goes under a lot of rocks**, from which **a long tail snake is resting**. Later that day, the snake is lying on the ground with a huge bulge in its middle. The **rodent** however is nowhere to be seen.

Q: Where is the rodent?

- 2 points—reference to the snake having eaten the deer (in the snake's tummy)
- 1 point—reference to the deer having been eaten or being dead without reference to the snake
- 0 points—reference to irrelevant or incorrect factors

5) Puma, Chilean Culture



Pumas are fierce hunters. They can run as fast as a car when they are young and fit but they get very slow and weak when they are old. One very hot day, an old and hungry **puma** is standing at the mouth of a cave, watching a **herd of rabbits** moving across a large open plain. When the herd has passed by, the **puma** begins to chase a **small rabbit** at the back of the herd. One by one, the **rabbits** nimbly jump across a river. But the puma returns to the cave, still hungry.

Q: Why is the puma still hungry?

- 2 points—reference to the puma being old or slow or weak and so not being able to catch the rabbits (he was too old and weak to jump over the river)
- 1 point—reference to the puma being unable to catch the rabbits without reference to him being old or slow or weak (he couldn't jump across the river to catch the rabbits)
- 0 points—reference to irrelevant or incorrect factors

6) Burglar, Chilean Culture



An **Chilean** burglar is about to break into a jewelers' shop in **Vina del Mar, Chile**. He skillfully picks the lock on the shop door. Carefully he steps over the electronic detector beam. If he breaks this beam it will set off the alarm. Quietly he opens the door of the storeroom and sees the **lapis lazuli** glittering. As he reaches out, however, he steps on something soft. He hears a screech of a rat runs out past him, toward the shop door. Immediately the alarm sounds.

Q: Why did the alarm go off?

- 2 points—reference to animal which the burglar disturbed setting off alarm by crossing beam (type of animal unimportant)
- 1 point—reference to burglar setting off alarm (he was startled by the animal so crossed the beam); reference to animal setting off alarm without explaining it crossed the beam (he trod on a cat and it set off the alarm)
- 0 points—reference to irrelevant or incorrect factors (the animal's screech set off the alarm); alternative reasons for alarm going off (a security camera saw him and set the alarm off)

7) Meeting, Chilean Culture



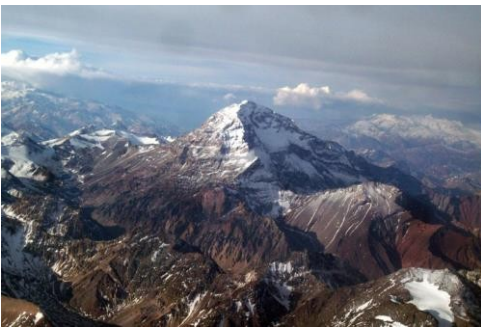
Carolina is going shopping. She needs **six brazos de reina (Chilean cake)** for her meeting. She goes from the bakery department to the **Chilean market**. In the bakery department she finds that there are two brands of **brazos de reina cakes** of the right kind. **Tasty brazos de reina** cost less in single packs than **grandma brazos de reina**. However, only

grandma brazos de reina come in multipacks of twenty. Carolina buys the multipack, even though she only needs six brazos de reina.

Q: Why does Carolina buy the multipack of *grandma brazos de reina*?

- 2 points—reference to saving money by buying the multipack
- 1 point—reference to convenience of having more brazos de reina, or future need for more brazos de reina; no mention of saving money
- 0 points—reference to irrelevant or incorrect factors (Grandma brazos de reina are taster)

8) Rock fall, Chilean Culture



In **stormy weather**, rocks often fall from the top of mountains. One day on **Mt. Aconcagua in the Andes**, a very large boulder becomes loose and starts rolling down the mountain. It rolls and rolls and rolls, gathering speed and spinning and bouncing off the mountain side. Suddenly, there is a very noisysplash.

Q: Why is there a loud splash?

- 2 points—reference to the boulder falling into water to make the splash (the boulder must have fallen into a lake)
- 1 point—reference to water without reference to the boulder (there was a pool at the bottom of the mountain)
- 0 points—reference to irrelevant or incorrect factors (it's verybig so it's very noisy)

APPENDIX C: CHAPTER 3, EXPERIMENTAL STIMULI, THE STRANGE STORIES TASK SPANISH VERSION

Pictures are excluded in this appendix as these are the same used in the English version.

Mindreading stories

1.1) Double Bluff: Liar story, Australian target.

Simon nació y se crió en Brisbane, Australia. Él es un mentiroso y un irreverente. El hermano de Simon, Jim, sabe que él es así y que Simon nunca dice la verdad. Ayer Simon sacó el bate de cricket de Jim, y él sabe que Simon la ha escondido en algún lugar de la casa, aunque él no pueda encontrarlos. Jim está muy enojado. Entonces, él ve a Simon y le dice: ¿Dónde está mi bate de cricket? Tú debes haberlo escondido en el mueble de cocina o bajo de tu cama, porque yo lo he buscado en todos lados. ¿Dónde está? ¿en el mueble de cocina o debajo de la cama? Simon le dice que la espada está debajo de la cama?

Pregunta: ¿Por qué Jim buscará el bate en el mueble de cocina?

1.2) Double Bluff: Liar story, Chilean target.

Rodrigo nació y se crió en Valparaíso. Él es un mentiroso y un irreverente. El hermano de Rodrigo, Matías, sabe que él es así y que Rodrigo nunca dice la verdad. Ayer Rodrigo sacó los zapatos de fútbol de Matías, y él sabe que Rodrigo los ha escondido en algún lugar de la casa, aunque él no pueda encontrarlos. Matías está muy enojado. Entonces, él ve a Rodrigo y le dice: ¿Dónde están mis zapatos de fútbol? Tú debes haberlos escondido en el mueble de cocina o bajo de tu cama, porque yo los he buscado en todos lados. ¿Dónde están? ¿en el mueble de cocina o debajo de la cama? Rodrigo le dice que los zapatos están debajo de la cama?

Pregunta: ¿Por qué Matías buscará sus zapatos en el mueble de cocina?

2.1) Double Bluff 2: Army story, Australian target.

Durante la guerra, el ejército enemigo capturó a un soldado de Australia. Ellos quieren que él les diga dónde están los tanques australianos. Ellos saben que los tanques o están en el mar o en las montañas. Además, ellos saben que el soldado australiano no les dirá dónde están los tanques, con seguridad él querrá salvar a su ejército y no les dirá dónde están. El soldado australiano es muy astuto y valiente, y no dejará que encuentren los tanques. Los tanques están realmente en las montañas. Cuando el enemigo le pregunta dónde están los tanques, él les dice: "los tanques están en las montañas".

Pregunta: ¿Por qué el soldado australiano dijo eso?

2.2) Double Bluff 2: Army story, Chilean target.

Durante la guerra, el ejército enemigo captura a un soldado chileno. Ellos quieren que él les diga dónde están los tanques chilenos. Ellos saben que los tanques o están en el mar o en las montañas. Además, ellos saben que el soldado chileno no les dirá dónde están los tanques, con seguridad él querrá salvar a su ejército y no les dirá dónde están. El soldado chileno es muy astuto y valiente, y no dejará que encuentren los tanques. Los tanques están realmente en las montañas. Cuando el enemigo le pregunta dónde están los tanques, él les dice: "los tanques están en las montañas".

Pregunta: ¿Por qué el soldado chileno dijo eso?

3.1)) Persuasion: Greedy Liar story, Australian target.

Brian vive en una granja en la región de Queensland, Australia. Él siempre tiene hambre. Hoy en la escuela han servido su comida favorita, rollos de vienasas. Él es un niño muy goloso, y a él le gustaría comer una buena cantidad de rollos más que nada en el mundo, aunque su mamá le ha preparado una comida sabrosa para cuando él llegue a su casa. Sin embargo, todos los niños pueden comer sólo dos rollos de vienasas y nada más. Cuando llega el turno de que le sirvan los rollos a Brian, él dice: “por favor me puede servir cuatro rollos de vienasas, porque yo no tendré comida cuando llegue a mi casa”.

Pregunta: ¿Por qué Brian dijo eso?

3.2) Persuasion: Greedy Liar story, Chilean target.

Felipe vive en el campo cerca de Chillán. Él siempre tiene hambre. Hoy en la escuela han servido su comida favorita, cazuela de ave. Él es un niño muy goloso, y a él le gustaría comer una buena cantidad de cazuela de ave más que nada en el mundo, aunque su mamá le ha preparado una comida sabrosa para cuando él llegue a su casa. Sin embargo, todos los niños pueden comer sólo un plato de sopa y nada más. Cuando llega el turno de que le sirvan sopa a Felipe, él dice: “por favor me puede servir dos platos de cazuela, porque yo no tendré comida cuando llegue a mi casa”.

Pregunta: ¿Por qué Felipe dijo eso?

4.1)) Persuasion 2: Kitten story, Australian target.

Jill nació y se crió en Sydney, Australia. Ella quería comprar un cachorro de pastor ganadero australiano por lo que ella fue a ver a la Sra. Smith quien tenía muchos cachorros que no quería. La Sra. Smith ama a sus cachorros, y ella no haría nada que los dañara, aunque ella no pudiera mantenerlos. Cuando Jill la visitó, ella no estaba segura que quería uno de los cachorros de la Sra. Smith porque todos eran machos y ella quería una hembra. Pero en ese momento la Sra. Smith dijo, “Si nadie compra los cachorros, tendré que ahogarlos a todos”.

Pregunta: ¿Por qué la Sra. Smith dijo eso?

4.2)) Persuasion 2: Kitten story, Chilean target.

Paulina nació y se crió en Santiago. Ella quería comprar un cachorro labrador, por lo que ella fue a ver a la Sra. Muñoz quien tenía muchos cachorros que no quería. La Sra. Muñoz ama a sus cachorros, y ella no haría nada que los dañara, aunque ella no pudiera mantenerlos. Cuando Paulina la visitó, ella no estaba segura que quería uno de los cachorros de la Sra. Muñoz porque todos eran machos y ella quería una hembra. Pero en ese momento la Sra. Muñoz dijo, “Si nadie compra los cachorros, tendré que ahogarlos a todos”.

Pregunta: ¿Por qué la Sra. Muñoz dijo eso?

5.1)) White Lie: Ugly ugg boots story, Australian target.

Un día Tía Jane fue a visitar a Peter a su casa en Sydney, Australia. Peter quiere mucho a su tía, pero ese día ella estaba usando unas botas uggs que Peter consideró muy feas. Peter cree que su tía se ve ridícula y que son mucho

más bonitas sus botas antiguas. Entonces, tía Jane le pregunta a Peter: ¿Te gustan mis nuevas botas? Peter contesta, “Están muy bonitas”.

Pregunta: ¿Por qué él dijo eso?

5.2)) White Lie: Ugly ugg boots story, Chilean target.

Un día Tía Alejandra fue a visitar a Martín a su casa en Concepción. Martín quiere mucho a su tía, pero ese día ella estaba usando una vestido que Martín consideró muy feo. Martín cree que su tía se ve ridícula y que son mucho más bonitos sus vestidos antiguos. Entonces, tía Alejandra le pregunta a Martín: ¿Te gustan mi nuevo vestido? Martín contesta, “Es muy bonito”.

Pregunta: ¿Por qué él dijo eso?

6.1)) White Lie 2: Guinea pig story, Australian target.

Helen nació y fue criada en Tasmania, Australia. Ella esperó todo el año navidad, porque ella sabía que en navidad ella podía pedirle a sus padres un cuye. Helen quería un cuye más que nada en el mundo. Al fin navidad llegó y Helen corrió para abrir el regalo que sus padres le hicieron. Ella estaba segura que el regalo contenía dentro un pequeño cuye en su jaula. Pero cuando ella lo abrió con toda su familia alrededor, ella vio solo un montón de DVDs educativos, los cuales Helen no deseaba en lo absoluto. Pero, cuando los padres de Helen le preguntaron si le gustó su regalo de navidad, ella dijo, “Es muy bonito, gracias. Es justo lo que quería.”

Pregunta: ¿Por qué ella dijo eso?

6.2)) White Lie 2: Guinea pig story, Chilean target.

Karina nació y fue criada en Antofagasta. Ella esperó todo el año navidad, porque ella sabía que en navidad ella podía pedirle a sus padres un hámster. Karina quería un hámster más que nada en el mundo. Al fin navidad llegó y Karina corrió para abrir el regalo que sus padres le hicieron. Ella estaba segura que el regalo contenía dentro un pequeño hámster en su jaula. Pero cuando ella lo abrió con toda su familia alrededor, ella vio solo un montón de calcetines, los cuales Karina no deseaba en lo absoluto. Pero, cuando los padres de Karina le preguntaron si le gustó su regalo de navidad, ella dijo, “Es muy bonito, gracias. Es justo lo que quería.”

Pregunta: ¿Por qué ella dijo eso?

7.1) Misunderstanding: Fearful woman story, Australian target.

Tarde en la noche, la señora Peabody está caminando a casa por **la Explanada en Townsville, Queensland, Australia**. A ella no le gusta caminar sola en la oscuridad porque ella siempre tiene miedo de que alguien la ataque y le robe. De hecho, ella es una persona muy nerviosa. De pronto, detrás de una palmera aparece un hombre. Él desea preguntarle a la señora Peabody qué hora es. Cuando la señora Peabody ve al hombre venir hacia ella, ella empieza a temblar y le dice: “¡Tome mi cartera, no me haga daño por favor!”

Pregunta: ¿Por qué ella dijo eso?

7.2) Misunderstanding: Fearful woman story, Chilean target.

Tarde en la noche, la señora Rodríguez está caminando a casa por **el paseo peatonal 21 de mayo en Arica**. A ella no le gusta caminar sola en la oscuridad porque ella siempre tiene miedo de que alguien la ataque y le robe. De hecho, ella es una persona muy nerviosa. De pronto, detrás de una **palmera** aparece un hombre. Él desea preguntarle a la señora Rodríguez qué hora es. Cuando la señora Rodríguez ve al hombre venir hacia ella, ella empieza a temblar y le dice: “¡Tome mi cartera, no me haga daño por favor!”

Pregunta: ¿Por qué ella dijo eso?

8.1) Misunderstanding 2: Burglar story, Australian target.

Un ladrón quien acaba de robar un centro comercial en el **centro de Brisbane, Australia**, está escapando. Mientras él va corriendo, un **policía** montado ve que a él se le cayeron unos **lentes**. Él no sabe que el hombre es un ladrón, él sólo desea decirle que se le cayeron sus lentes de sol. Pero cuando el **policía** le grita al ladrón, “¡Hey tú, detente!” El ladrón se da vuelta, ve al policía y se entrega. Él pone sus manos arriba y admite que él fue quien entró a robar al centro comercial.

Pregunta: ¿Por qué el ladrón hizo eso?

8.2) Misunderstanding 2: Burglar story, Chilean target.

Un ladrón quien acaba de robar un centro comercial en el **paseo Ahumada** está escapando. Mientras él va corriendo, un **carabinero** montado ve que a él se le cayeron unos **lentes de sol**. Él no sabe que el hombre es un ladrón, él sólo desea decirle que se le cayeron sus lentes. Pero cuando el **carabinero** le grita al ladrón, “¡Hey tú, detente!” El ladrón se da vuelta, ve al carabinero y se entrega. Él pone sus manos arriba y admite que él fue quien entró a robar al centro comercial.

Pregunta: ¿Por qué el ladrón hizo eso?

Control stories

1.1) Jercoaster, Australian culture

Bruce y Jim son buenos amigos. Ellos crecieron en Queensland, Australia, y ambos tienen 10 años de edad. Bruce tiene pelo castaño, tiene los ojos verdes y mide más de 5 pies de altura. Jim es distinto que Bruce. Él tiene pelo rubio, tiene los ojos azules y es mucho más bajo que Bruce. Bruce y Jim decidieron ir a Dreamworld, un parque de diversiones en Gold Coast, Australia. Ellos se subieron a muchos juegos. Para el último juego del día, ellos decidieron ir a la “caída gigante”, pero había un letrero que decía “por razones de seguridad ninguna persona bajo 5 pies de altura podrá subir”.

Pregunta: ¿Por qué sólo Bruce subió a la caída gigante?

1.2) Jercoaster, Chilean culture

Daniel y Cristián son buenos amigos. Ellos crecieron en Santiago y ambos tienen 10 años de edad. Daniel tiene pelo castaño, es blanco y mide más de 135 centímetros. Cristián es distinto que Daniel. Él tiene pelo negro, es moreno y es mucho más bajo que Daniel. Daniel y Cristián decidieron ir a fantasilandia. Ellos se subieron a un montón de juegos.

Para el último juego del día, ellos decidieron ir al Raptor, pero había un letrero que decía “por razones de seguridad ninguna persona bajo 135 centímetros podrá subir”.

Pregunta: ¿Por qué sólo Daniel subió al Raptor?

2.1)) Skiing, Australian Culture

Jack nunca ha esquiado antes y tiene muchas ganas de ir de vacaciones este invierno a Nueva Zelanda para esquiar por primera vez. Todo los implementos para sus vacaciones están listos. Su mamá ha comprado un par de gafas y ha encerado y pulido completamente la base de sus esquís. En el primer día de vacaciones de Jack, sus esquís se resbalaron debajo de él , produciendo que él cayera en la nieve.

Pregunta: ¿Por qué Jack se cayó a la nieve?

2.2) Sandboarding, Chilean Culture

Guillermo nunca ha practicado sandboard antes y tiene muchas ganas de ir de vacaciones este verano al desierto de Atacama para hacer sandboard por primera vez. Todo los implementos para sus vacaciones están listos. Su mamá ha comprado un par de gafas y ha pulido completamente su tabla y ha soltado las amarras de los pies. En el primer día de vacaciones de Guillermo, se soltaron las amarras de sus pies, produciendo que él cayera en la arena.

Pregunta: ¿Por qué Guillermo se cayó a la arena?

3.1) ling animals, Australian Culture

El pingüino emperador vive en la Antártica, donde es extremadamente frío. Allí hay siempre nieve en el suelo y hielo en la superficie del mar. Generalmente, los pingüinos están parados todos juntos en grupos. Después de un rato, un pingüino en el medio del grupo se mueve hacia el límite exterior del grupo, cambiando lugares con uno de los pingüinos del exterior del grupo.

Pregunta: ¿Por qué los pingüinos se cambian de lugares?

3.2) ling animals, Chilean Culture

El huemul vive en el sur de Chile, donde hay muchos insectos en verano. Hay moscas y zancudos que molestan todo el día a los huemules. Generalmente, los huemules pueden estar parados todos juntos en grupos. Después de un rato, los huemules en el medio del grupo se mueven hacia el límite exterior del grupo, cambiando lugares con uno de los huemules del exterior del grupo.

Pregunta: ¿Por qué los huemules cambian de lugar?

4.1) ake, Australian Culture

Las serpientes son animales sorprendentes. Ellas tienen una piel elástica, la cual cambian una vez al año y también pueden separar sus mandíbulas lo que le permite abrir ampliamente su hocico. La pitón australiana es un ejemplo de serpiente. Un día, una zarigüeya fue bajo un árbol, en el cual una pitón estaba bajando. Más tarde, la pitón se arrastró por el suelo con un bulto en su estómago. La zarigüeya no estaba en ninguna parte.

Pregunta. ¿Dónde está la zarigüeya?

4.2) ake, Chilean Culture

Las serpientes son animales sorprendentes. Ellas tienen una piel elástica, la cual cambian una vez al año y también pueden separar sus mandíbulas lo que le permite abrir ampliamente su hocico. La serpiente cola larga chilena es un ejemplo de serpiente. Un día, un roedor se acercó bajo una piedra, en la cual una serpiente cola larga estaba descansando. Más tarde, la serpiente se arrastró por el suelo con un bulto en su estómago. El roedor no estaba en ninguna parte.

Pregunta. ¿Dónde está el roedor?

5.1) Dingo, Australian Culture

Los dingos son cazadores feroces. Ellos pueden correr tan rápido como un auto cuando son jóvenes y están en forma, pero cuando ellos son viejos, se vuelven lentos y débiles. Un día muy caluroso, un dingo viejo y hambriento estaba parado cerca de su cueva, mirando un grupo de liebres moviéndose a lo largo de un plano abierto. Cuando el grupo pasó cerca del dingo, éste comenzó a perseguir a una liebre pequeña que estaba en la parte posterior del grupo. Una a una, las liebres saltaron un río. Luego, el dingo volvió a su cueva, aún hambriento.

Pregunta: ¿Por qué el dingo aún sigue hambriento?

5.2) ma, Chilean Culture

Los pumas son cazadores feroces. Ellos pueden correr tan rápido como un auto cuando son jóvenes y están en forma, pero cuando ellos son viejos, se vuelven lentos y débiles. Un día muy caluroso en la cordillera chilena, un puma viejo y hambriento estaba parado cerca de su cueva, mirando una camada de liebres moviéndose a lo largo de un plano abierto. Cuando la camada pasó cerca del puma, éste comenzó a perseguir a una liebre pequeña que estaba en la parte posterior de la camada. Una a una, las liebres saltaron un riachuelo. Luego, el puma volvió a su cueva, aún hambriento.

Pregunta: ¿Por qué el puma aún sigue hambriento?

6.1) ar, Australian Culture

Un ladrón australiano está a punto de entrar a robar a una joyería en el centro de la calle de la reina en Brisbane. Él es sumamente hábil para abrir cerrojos. Él pasa cuidadosamente por las luces de seguridad detectoras de movimiento. Si él toca las luces se activará la alarma. Con sumo cuidado, él abre la puerta interior de la joyería y ve los diamantes que desea robar. Mientras él los toma, inesperadamente, pisa algo suave. Él escucha el chillido de una zarigüeya la cual corre enfrente de él, hacia la puerta de entrada de la joyería. Inmediatamente, la alarma comienza a sonar.

Pregunta: ¿por qué la alarma sonó?

6.2) ar, Chilean Culture

Un ladrón chileno está a punto de entrar a robar a una joyería en el centro de Temuco. Él es sumamente hábil para abrir cerrojos. Él pasa cuidadosamente por las luces de seguridad detectoras de movimiento. Si él toca las luces se activará la alarma. Con sumo cuidado, él abre la puerta interior de la joyería y ve los lápiz lazuli que desea robar. Mientras él los

toma, inesperadamente, pisa algo suave. Él escucha un chillido de ratón el cual corre enfrente de él, hacia la puerta de entrada de la joyería. Inmediatamente, la alarma comienza a sonar.

Pregunta: ¿por qué la alarma sonó?

7.1) Meeting, Australian Culture

Alison va a ir de compras. Ella necesita 6 lamingtons para una reunión. Ella se dirige hacia la panadería que está dentro de un famoso mercado de Australia. En la panadería, ella se da cuenta que hay dos marcas de queques de lamingtons que puede llevar. *Lamingtons riquísimos* que cuestan menos en paquetes individuales que los *Lamingtons de la abuela*. Sin embargo, sólo los *lamingtons de la abuela* vienen de a 20 unidades en un paquete. Alison compra las 20 unidades, aunque ella solo necesitaba 6 lamingtons.

Pregunta: ¿por qué compra las 20 unidades de lamingtons de la abuela?

7.2) Meeting, Chilean Culture

Carolina va a ir de compras. Ella necesita 6 brazos de reinas para una reunión. Ella se dirige hacia la panadería que está dentro del Líder. En la panadería, ella se da cuenta que hay dos marcas de brazos de reina que puede llevar. *Brazos de reina riquísimos* que cuestan menos en paquetes individuales que los *brazos de reina de la abuela*. Sin embargo, sólo los *brazos de reina de la abuela* vienen de a 20 unidades en un paquete. Carolina compra las 20 unidades, aunque ella solo necesitaba 6 brazos de reina.

Pregunta: ¿por qué compra las 20 unidades de los brazos de reina de la abuela?

8.2) Rock fall, Australian Culture

En las tormentas, las rocas tienden a caerse de la cima de las montañas. Un día, en el monte Kosciuszcko en Nueva Galés del Sur, Australia, una gran roca se soltó y comenzó a caer de ella. Comenzó a descender abruptamente, ganando velocidad y dando giros bruscos. Repentinamente, hay un gran sonido de salpicadura.

Pregunta: ¿Por qué hubo un gran sonido de salpicadura?

8.2) Rock fall, Chilean Culture

En las tormentas, las rocas tienden a caerse de la cima de las montañas. Un día, en la montaña Aconcagua de la cordillera de los Andes, una gran roca se soltó y comenzó a caer de ella. Comenzó a descender abruptamente, ganando velocidad y dando giros bruscos. Repentinamente, hay un gran sonido de salpicadura.

Pregunta: ¿Por qué hubo un gran sonido de salpicadura?