AGE, GENDER, AND INDIVIDUAL DIFFERENCES IN EXPLANATORY STYLE

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Introduction
Explanatory style, the habitual manner in which a person explains the causes of events, has been studied extensively in adults but relatively little is known about this phenomena in children. Research interest in the concept of explanatory style was first expressed in 1978 when Abramson, Seligman, and Teasdale published an attributional reformulation of helplessness theory. The original helplessness theory hypothesized that experience with uncontrollable events led to difficulties in motivation, cognition, and emotion. The reformulated theory postulated a mediating effect for causal attributions in the process by which uncontrollable events produce behavioural deficits (Peterson, Maier, & Seligman 1993).

In examining the specific ways in which individuals cope with and explain uncontrollable events, Abramson et al. (1978) postulated that people develop a characteristic causal explanation for unpredictable life events which they termed "attributional style". This predisposing explanatory set was later termed "explanatory style" by Peterson and Seligman (1984). In the original formulation of attribution theory, Heider (1958) had distinguished between perceived internal and external causes for events. Subsequently, Weiner (1972) drew a distinction between stable versus unstable causes, with stable attributions for failure being seen to contribute towards poor or low levels of motivation. The third dimension of helplessness was introduced by Kelley (1972) who focussed on ascriptions of global versus specific causes for adverse events. Attributions to global causes are more likely to generalise across a variety of situations, thus engendering helplessness in the face of failure, whereas specific causality is likely to be restricted to particular situations and outcomes.

These three causal explanatory dimensions (ie permanence relating to stable versus unstable causes, personal relating to internal versus external causal statements, and pervasive relating to universal versus specific causal explanations) were incorporated into the reformulated attribution theory of learned helplessness. Abramson et al. (1978) saw the reformulated theory as accounting for habits of explanation rather than for single explanations of single failures as Weiner's attributional theory had done. These explanatory habits were seen to comprise a characteristic style of explanations which individuals impose on their world, allowing them to explain causes of events, at the same time as giving them a predisposition to view everyday interactions and events from a predominately positive (ie optimistic) or negative (ie pessimistic) framework.

Explanatory style ranges from pessimistic to optimistic in quality (Eisner & Seligman, 1994). A pessimistic explanatory style is
characterised by explanations of the causes of bad events as being stable, global, and internal, and the causes of good events as being unstable, specific and external in nature. Conversely, optimistic explanatory styles are characterised by explanations for bad events as being due to unstable, specific and external causes, while good events are perceived as due to stable, global and internal causes. People with pessimistic explanatory styles are more likely to experience pervasive and chronic symptoms of helplessness when faced with uncontrollable negative events (Eisner & Seligman, 1994). The tendency for depression when faced with bad events has been demonstrated with adults (Petersen & Seligman, 1984), and for children from ages 8 to 13 years (Seligman et al., 1984, Nolen Hoeksema et al., 1986).

In addition to these findings with respect to depression in adults, those in the workplace with an optimistic explanatory style show greater work productivity relative to those with a pessimistic style (Seligman & Schulman, 1986). The deleterious effects of a pessimistic style have also been implicated in studies of athletic performance and illness (see Seligman, 1990).

The Measurement of Explanatory style

(1) Explanatory style in Adults

The Attributional Styles Questionnaire (ASQ) has become the major instrument used in explanatory style research with adults. The scale was originally used by Seligman, Abramson, Semmel, and von Baeyer (1979) and later described in detail by Peterson, Semmel, von Baeyer, Abrahamson, Metalsky, and Seligman (1982). Some variations are found in the literature, but in the basic form the ASQ presents subjects with six bad events and six good events, and asks them to rate the cause of each event on a seven-point scale according to its personal dimension (internality vs externality), permanence (stability vs instability) and pervasiveness (globality vs specificity). Scores are obtained for the three variables, internal, stable and global, and these are averaged across the good and bad events separately. Sometimes a composite explanatory style score is formed by combining scores from the three dimensions (Peterson et al., 1993). The CAVE technique (Content Analysis of Verbatim Explanations) has also been employed with adults particularly when a retrospective analysis of explanatory style is required. In this method, verbal or written causal effect statements by subjects are rated along the the same permanent, personal and pervasive dimensions.

(2) Explanatory Style in Children

For children, three separate methods of assessing optimism have emerged: the vignette method, the direct approach, and the children's version of the ASQ (Children's Attributional Style Questionnaire or CASQ: Seligman, Peterson, Kaslow, Tanenbaum, Alloy & Abramson, 1984). The vignette method has been found to be suitable for young children (Stipek, 1981; Stipek, Lamb, & Zigler, 1981). Children are
individually asked to respond to a series of brief incomplete vignettes depicting events occurring to peers by predicting the most likely of two possible outcomes. Their responses are scored according to the frequency of positive outcomes nominated.

The direct questionnaire method has been used with elementary school-aged children (Fischer & Leitenberg, 1986) and with college, adults and clinical samples (see Scheier & Carver, 1992 for a review). In this approach, optimism is viewed as a stable disposition, a generalised expectancy that favourable outcomes will eventuate in most future situations. Respondents are asked to rate themselves on a series of items such as "I'm always optimistic about my future." Results from these direct measures reveal correlations between optimism and other indices of self-function such as self-esteem, self-percepts of ability and subjective well-being. At the adult and clinical level, optimism has also been predictive of relatively successful coping and recovery indices in aspects as diverse as stress in university life, mental health, cancer illness, myocardial infarction, severe surgery, need for medication and health-enhancing activities (Scheier & Carver, 1992). With children, the direct method has yielded the interesting finding that virtually all children, at least up to 12 years of age, hold naturally optimistic expectancies about the future (Fischer & Leitenberg, 1986).

The Children's Attributional Style Questionnaire (CASQ), a forced choice instrument, was developed by Seligman et al., (1984) when they found young children had difficulty completing the adult ASQ, particularly the rating of globality. An earlier version, known as the KASTAN had been developed but not published. The CASQ consists of 48 items of hypothetically good or bad events involving the child, followed by two possible explanations. For each event, one of the permanent, personal or pervasive explanatory dimensions is varied while the other two are held constant. Sixteen questions pertain to each of the three dimensions, with half referring to good events and half referring to bad events. The CASQ is scored by the assignment of 1 to each internal or stable or global response, and a 0 to each external, or unstable or specific response. Scales are formed by summing the three scores across the appropriate questions for each of the three dimensions, for composite positive (CP) and composite negative (CN) events separately (Peterson et al., 1993). In some cases a composite total score (CT) is calculated by subtracting the score for the negative events from the score for the positive events (Nolen-Hoeksema, Girms, & Seligman, 1986).

Explanatory Style and Depression

When the reformulated model of learned helplessness was first promulgated by Abramson, Seligman, and Teasdale (1978) it appeared in a special issue of the Journal of Abnormal Psychology which was devoted to learned helplessness as a model of depression. Peterson et
al., (1993) postulate that this original citation set the scene for the predominant use of the theory in relation to depressive disorders. When people explain bad events in terms of "character flaws" (internal, stable, and global causations) they put themselves at risk, "for apathy, depression, failure, illness and even death. Those who blame themselves for bad events and feel powerless to change them will find themselves in a particular stressful situation." (Peterson & Bossio, 1991, p.16)

The preoccupation of researchers with associations between explanatory style and depression is also apparent in the application of the explanatory style hypothesis to child and adolescent populations. A large number of studies have examined the relationship between explanatory style and depression in children (Asarnow & Bates, 1988; Berfield, Palmer, Pfefferbaum, & Stowe, 1988; Curry & Craighead, 1990; Dalley, Bolocofsky, Alcorn, & Baker, 1992; DeMoss, Milich, & DeMers, 1993; Garber, Weiss, & Shanley, 1993; Kaslow, Rehm, Pollack, & Siegel, 1988; McCauley, Mitchell, & Burke; 1988; McCauley, Mitchell, & Burke; 1988; Nolen-Hoeksema, Girgus, & Seligman, 1986, 1991; Panak & Garber, 1992; Robins & Hinkley, 1989; Seligman et al., 1984;)

The findings from these studies are consistent with the well-articulated hopelessness theory of depressive functioning (Abramson, Metalsky & Alloy, 1989). The relationship between health/illness indices and explanatory style in children and adolescents has also been explored, specifically in relation to cancer patients (Madan-Swain, Sexton, Brown, & Ragab, 1993), children with insulin-dependent diabetes mellitus (Kuttner, Delamater, & Santiago, 1990; Brown, Kaslow, Sansbury, & Meacham, 1991), and in relation to attempted suicide in adolescents (Spirito, Overholser, & Hart, 1991). Yates, Yates, and Lippett (1995), as well as Nolen-Hoeksema et al. (1986) have reported significant correlations between CASQ data and school achievement measures.

THE DEVELOPMENT OF EXPLANATORY STYLE

The precursors and development of explanatory style in children have received scant experimental examination, although it is thought that adult-like optimism and pessimism appear during the Piagetian concrete operations stage (see Peterson & Bossio, 1992). Nolen-Hoeksema (cited in Peterson & Bossio, 1991), in an unpublished study, interviewed 94 children from four to eight years of age, asking them to talk about why each of six hypothetical events might happen to them. The results of these explanations were examined using the CAVE analysis, and yielded the finding that the youngest children (4 to 5 years old) were significantly less likely than older children to explain bad events by internal and global causes. No age differences in the stability dimension were found.

Since the CASQ is a pencil and paper test, studies have only been reported with children from the age of eight years. General developmental trends have yet to be investigated. It is thought that in
adolescence optimism or pessimism "becomes solidified as a cognitive habit, depending on the degree to which each is entwined with the child's developing identity" (Peterson & Bossio, 1991; p. 69).

Likewise, there has been little investigation of sex differences in explanatory style. However, Nolen-Hoeksema et al. (1991) and Yates et al. (1995) reported boys as evidencing a more negative pattern than girls. In the Yates et al study the differences between the sexes achieved significance on both positive and negative subscales, while Nolen-Hoeksema et al (1991) found significant results for boys predominantly on the negative scale, with a significant difference being found only on those positive items that related to family interactions. These findings that preadolescent boys possess a relatively more negative or depressogenic explanatory style clearly need further investigation, particularly given that the study of sex differences in depression has yielded unclear and conflicting findings. In relation to depression, different factors appear to be salient at different points in development for the two sexes (see Nolen-Hoeksema, 1990).

Psychometric Properties of Explanatory Style measures
As a psychological construct to explain children's causal ascriptions of bad events, the CASQ measure has been found to be relatively stable in the short term. Seligman et al. (1984) found a test-retest reliability coefficient (Cronbach alpha) for children over a six-month period to be 0.71 for the composite positive (CP) score and 0.66 for the composite negative (CN) score. The relationship for the composite total (CT) score, in which the negative is taken from the positive, was reported as 0.73. Similar levels of reliability were found for adults using the ASQ over a five week period with 0.70 being reported for the CP score, and 0.64 for the CN scores. Similar levels of reliability have been reported for the time periods of up to a year. Seligman et al. (1984) report the scale intercorrelations for CASQ as being moderate, and less than that for the adult scale. Measures of internal consistency for the composite negative (CN) and composite positive (CP) scales, using the Kuder-Richardson formula for items with binary choices are reported by Nolen-Hoeksema et al. (1991) as being 0.52 and 0.57 respectively. Panak and Garber (1992) report internal consistency of the difference score (CT) as 0.62 with the use of Guilford's formula. From the use of the ASQ with adolescents, Garber, Weiss and Sharney (1993) report an internal consistency reliability coefficient of 0.54. Finally in a study of childhood depression over five years, Nolen-Hoeksema et al. (1992) reported co-efficient alphas for composite positive (CP) scores ranging from 0.47 to .64., over the nine testing sessions, with a median of 0.58. There was no systematic change with the age of the children. The coefficient alphas for the composite negative (CN) scores ranged from 0.42 to 0.61 with the median of 0.56. There were no systematic changes with the age of the children who were in Grade 3 at the commencement of the study.
In each of the studies reporting internal consistency reliabilities the estimates have been made for the composite scores for the positive
subscales, the negative subscales, and the overall score which is derived from taking the negative score from the positive score. While the negative and positive composite scores have been obtained by summing across the three dimensions of explanatory style (internality, stability and globality) Nolen-Hoeksema et al. (1992) note that generally the reliabilities of the subscales are low. They also comment that subscales on the CASQ have been combined in different ways in different studies (eg, Curry & Craighead, 1990; Kaslow et al., 1984; McCauley et al., 1988). They found that the composite positive and negative scores tended to be negatively correlated with each other. They also suggested that the difference between these two scores constituted the best measure of explanatory style, but this suggestion has not been substantiated by any detailed analysis of the scale. In view of the apparently low internal consistency of the CASQ, the question of what actually constitutes explanatory style has yet to be fully explored.

THE PRESENT STUDY
The present study was designed to investigate the development of explanatory style in children, taking into account age, gender and individual differences. The CASQ was administered to 293 children in two Adelaide metropolitan primary schools in Years 3, 4, 5, 6 and 7, in Term 1 1993. The results were analysed with the Rasch Procedure using the Quest program (Adams & Khoo, 1993).

It is unclear from the research literature whether the CASQ should be regarded as two separate scales (CP and CN) or as a single scale (CT). The 24 positive items (CP), the 24 negative items (CN) and the composite measure (CT) in which CN items were subtracted from the CP items, were analysed separately. Within the analyses for each of the three scales, the basic question posed was whether the scale fitted the Rasch model. Of particular interest was the consideration of the CT scale to determine if the construct of explanatory style could be represented as a single dimension. When the goodness of fit for the Rasch model had been determined, each scale was examined with respect to gender bias. Finally, individual differences were examined particularly with respect to age (year level) and gender differences. Consideration of these two factors was necessary because it was unclear whether the scales were effective with young children, and whether the gender effects reported by Yates et al. (1995) arose from specific items with a gender bias.

The Rasch procedure was considered highly appropriate for the analysis of the CASQ because the model postulates the independence of the measurement of the performance of the subjects from the particular test items used, if the scale is unidimensional (Wright & Stone, 1979). At the same time the results from the analysis of the items and the distribution and characteristics of the students results can be placed on a common scale. Further assumptions of the Rasch model include that the estimates of task difficulties are independent of the particular
persons whose performances are used to estimate them, and that the estimates of the performance of persons are independent of the particular tasks that they attempt. Thus, different persons can attempt different sets of items, yet their performances can be estimated on the same scale.

It was anticipated that the Rasch analysis would strengthen existing knowledge of the psychometric properties of the CASQ.

Results and Discussion
1. The Composite Positive (CP) and Composite Negative (CN) Scales
The results of the Rasch analyses of the CP and CN scales indicated that these scales fitted the Rasch model and they could be considered independently (see Figures 1 and 2). For both scales the infit mean square statistics, which indicate the fit of an item to the scale, independently of the size of the sample, lay within the range of 0.9 and 1.0, establishing a high degree of fit of all items to the two separate scales, CP and CN. In the case of the CP scale, 14 of the 24 items were located above 0 which is the mean of the items while the students' scores were distributed relatively symmetrically around the mean. Fourteen students had low scores which fell below -1, indicating low levels of optimism.

In the CN scale the items were also symmetrically distributed, with the scale mean set around zero (0). The students' scores, however, clustered predominantly below the scale mean, indicating their relatively optimistic style. Approximately 14 students were above the scale mean. Thus the two scales can be seen to be functioning very differently with respect to the students' distributions.

2. Gender bias in the CP and CN scales.
(a) The CP scale
Male and female differences were initially investigated with a plot of the adjusted estimates (see Figure 3). The majority of the items were within the acceptable range with the exception of three items. When the items were compared in terms of their standardised differences (see Figure 4) it was apparent that items 1 and 44 were biased significantly in favour of males. This bias indicates that when the CP scale is considered independently, boys are more likely than girls to respond positively to these two items (indicated on Figure 4 as easier items). Thus, the estimates of optimism in boys may be slightly enhanced relative to that of girls, by virtue of these items. There were no items biased significantly in favour of females.

(b) The CN scale
 Differences between males and females were originally plotted in terms of their adjusted estimates (see Figure 5). When those differences were standardised it became apparent that only Item 26 was significantly biased in favour of girls (see Figure 6). Thus in the measuring of pessimism, girls were more likely than boys to respond negatively to
Item 26, this potentially increasing slightly the reported level of pessimism in girls. Their were no items on this scale that were significantly biased in favour of boys.

3. The Composite Total (CT) scale
(a) Infit statistics
As the CP and CN scales independently fitted the Rasch Model, it was necessary to determine whether the composite scale of explanatory style, derived by taking the scores on the negative scale (CN) from the scores on the positive scale (CP) also fitted the model. An examination of the item fit statistics showed that all items fitted a single scale with the infit mean square values for all items lying in the range 0.9 to 1.1. The CT clearly measured explanatory style on a single scale. An inspection of the range of the students' responses indicated that the majority were optimistic as their scores were above the item mean of 0 (see Figure 7).
(b) Gender bias
The CT scale was then examined for evidence of gender bias. The adjusted estimates were plotted (see Figure 8) and the differences standardised (see Figure 9). The standardised differences indicated that three items (1, 26, 44) were biased significantly in favour of males. No evidence for female bias was found. The evidence of bias for Item 26 for females on the CN scale alone became, on the CT scale, a male biased item because of the reversal of the CN scale to obtain the total. The scale as a whole was thus slightly biased in favour of males, providing males with a score more optimistic than would be observed with unbiased items.

In considering these biased items it is apparent that both Item 1 and Item 26 relate to school performance, with boys evidencing a greater degree of inner self confidence when accounting for their success in school. This self-assurance factor has been investigated recently in college students by Lundeberg, Fox, and Puncochar (1994) who found that male students (but not females) maintained high levels of confidence in their test performances even when they were responding incorrectly. In essence, males appear to readily display higher levels of overconfidence in school situations than females.

The bias in Item 44 is more difficult to interpret as it refers to the child being given a free ice-cream. It may be postulated that perhaps the boys in this study were more likely to account for their free ice-cream for reasons of personal agency, rather than the altruistic predisposition of the male ice-cream vendor.

4. Individual Differences
In the use of the CASQ scale, various researchers have chosen to use the CP, CN, or CT scale either alone or in combinations, with emphasis being placed on the CN scale (see Nolen-Hoeksema et al., 1992). The Rasch analysis has clearly indicated that the CT scale could be used in preference to either the CP, or CN alone, but the empirical question of
the identification of students whose scores lie outside any (nominal) acceptable range still needs to be addressed.

(a) Item estimates
The distribution of the students' responses on the CP and CN scales (see Figures 1 and 2) indicated that in the case of the CP scale, students whose scores fell below the item mean particularly those below -1, may need particular attention. On the CN scale, where the majority of the students were below the mean of the items, those students whose scores placed them above the mean of the scale may also warrant further consideration.

(b) Case estimates
Information can also be gathered by considering the case estimates information given by the QUEST program (Adams & Khoo, 1993). For the CP scale 14 students had an infit t value that was outside the acceptable range of +2, but given 293 respondents this number is less than would be expected at the five per cent chance level, so is not considered of consequence. Within this group there was little difference with respect to year level and gender, with the exception of Year 3 which did not have any students at all with an infit t outside the acceptable range. Thus it can be argued that the younger students were not responding in an erratic manner on the questionnaire.

For the CN scale eight respondents had an infit t value of greater than plus or minus 2 , with this number being below that expected by chance alone. The majority of these students were male and were predominantly in Year 6. It is possible these students were responding in an erratic manner but presumably not because of an inability to read or understand the questionnaire.

(c) Students with inconsistent patterns of responding
From the case estimate data it was apparent that 13 students on the CP scale, 13 students on the CN scale, and 18 students on the CT scale had inconsistent patterns of response. The Rasch analysis lends itself to the identification of differences that could not be determined if the scores are merely tallied as per traditional methods. The significance of these differences requires further consideration. Longitudinal analysis are necessary to determine if these are stable and consistent trends, and if these inconsistencies can be explained or correlated with other characteristics of these students. We are currently engaged in the process of obtaining additional data which may shed further light upon these issues.

CONCLUSIONS

1. The CP, CN and CT scales fitted the Rasch model.
2. The robustness of the CT scale was affirmed, and thus the construct of explanatory style, as a consistent manner of reacting to personally relevant situations, was further supported by this data analysis.
3. The CP and CN scales were also robust although each alone

functioned independently and in opposite directions.
4. The CT scale could be used instead of the CP or CN scales alone.
5. There was evidence of some minimal gender bias in all three scales, with three items in the CT scale being biased towards males. While this may not be of particular significance for the majority of students, it may be useful to bear in mind when considering the scores of pessimistic males. They in fact may be slightly more pessimistic than their results would indicate. For these students the implications of their pessimistic (depressogenic) style may need further investigation. The use of the Kidmaps from the Rasch analysis would assist in this investigation.
6. The students in this study were predominantly optimistic. However, evidence of the stability of these measures over time is needed, particularly as the students move into adolescence.
7. This study was conducted with a non-representative sample of primary school children in Years 3 to 7 in two metropolitan primary schools in Adelaide. The individual differences with respect to the scales and the age and gender trends described may be partially idiosyncratic to this population. Replication of this study with a more representative population may be desirable.
8. Utilisation of the Rasch model in the analysis of the CASQ enabled the items and the students to be analysed conjointly with each other, with the placement of the information on a common scale for each of the CP, CN and CT scales.

REFERENCES


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