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Illusory Correlation in Popular Beliefs about the Causes of Happiness[1]

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Experiment I demonstrates that, contrary to objective data, most people believe that happiness is strongly associated with good health, number of friends, country or small town residence, no disability, income, intelligence and type of work. When presented with case study data in which health, friends, country or small town residence, no disability, income, intelligence Experiment II perceived positive correlations. At the same time the majority of subjects correctly detected true positive, zero, and negative correlations for other factors not usually associated with happiness. There was no evidence in recognition test data that confirming instances were better encoded than disconfirming instances in any of the relationships presented. A simple associative trace model accounts for most laboratory results. Popular beliefs about happiness could arise either from a halo effect among "good things of life" or an overgeneralization from vivid short-term to pallid long-term effects. The unobservability of inner mental states in others sets the stage for definitional confusion and illusory correlation.

This paper is organized as follows. A brief review of the literature establishes the point that most objective social/environmental circumstances are essentially uncorrelated with stable level of well-being or "general happiness". Experiment I then demonstrates by a questionnaire task that some of these uncorrelated variables are nevertheless believed by the majority of adults to be predictive of different levels of happiness. These incorrect beliefs, which are undoubtedly shared by many social scientists, are, by definition, illusory correlations.

The next question is why people hold beliefs that are presumably contradicted by the real-life data all around them. One possibility is that people misperceive, misrecall or misunderstand such data as they do encounter. Experiment II demonstrates this effect. When adult subjects are shown case materials in which the popular factors of health, number of friends, and income are zero-correlated with happiness, they report seeing the positive correlations they expected to see.

A detailed analysis of recognition test results in Experiment II further suggests that illusory correlations are not simply a fault of selective memory for belief-confirming as opposed to belief-disconfirming instances. However, this technical analysis is deferred to the Appendix where it can be found by readers interested in the cognitive mechanism of illusory correlation.

The Non-Correlates of Happiness

The best single demonstration of the near-zero correlations between objective life circumstances and a sense of well-being is given in an article by Campbell (1976) which summarizes the relevant findings of a 1972 national random survey on 2164 American adults. The study is reported more fully in Campbell, Converse and Rodgers (1976).

It is worthwhile to list here the correlations between the ten factors reported by Campbell and the index of general affect as presented in his Table 1 (Campbell, 1976). These correlation values are *eta* coefficients and are interpretable in the same way as Pearson *rs* except that they do not require a linear relationship and can accept categori-

1. Appreciation is expressed to Peter Bradshaw for his encouragement at all stages, and to Brian Niven for computer analyses of the data. Requests for reprints should be addressed to Richard Kammann, Department of Psychology, University of Otago, Dunedin, New Zealand.

cal, including binary, variables. The ten factors and their coefficients are: life cycle (.24); working/other (.18); family income (.18); type of work (.17); city size (.14, inverse relationship); religion (.11); level of education .10); race (black/white, .08); age (.08, inverse relationship); sex (.02).

When the foregoing ten variables are combined by a multiple classification analysis (equivalent to multiple regression without linear relationships), the resulting R value is .33 and the R^2 value is .11 which is to say that together these ten factors can only account for 11% of the variance in well-being. Similar results were also found by Andrews and Withey (1976, p. 139) in another American random sample in which life cycle, family income, education, race, age and sex together accounted for only 5% of the variance in their measure of well-being. A smaller scale study on 118 New Zealand adults contacted by a random postal survey in 1980 also found that income, education, EPI extraversion, broken home in childhood, birth order, age, and sex were likewise inconsequential as predictors of well-being (Kammann, in press).

Although the individual correlations are uniformly low, the *life cycle* and *working/other* variables are tentatively placed in a separate category as possibly "real" factors contributing to happiness levels.[2] With these two strongest factors set aside, it is clear that the remaining variables, both singly and in combination, are practically inconsequential as happiness factors.

These consistent findings cannot be explained away by an assumption that the measures of well-being were inadequate. On the contrary, Affectometer 1 used in the New Zealand study, Campbell's index of affect, and Andrews and Withey's life-as-a-whole on the delighted-terrible rating scale are, in that order, among the best of all well-being scales currently available. These three scales have high reliability, load highly on a general factor of well-being identified by factor analysis, and are but slightly contaminated with response artifacts associated with social desirability, response acquiescence, and mood at the time of responding to the question (Note 1).

The available data show that other circumstance factors that might be expected to predict general happiness do no better than the ones already considered. Among these are *health* (Brickman, Coates and Janoff-Bulman, 1977; Campbell, et al. 1976, p 374; Krupinski and MacKenzie, 1979); *number of friends* (Moudon, 1976; Campbell et al. 1976, p. 374), *intelligence* (Wilson, 1967), *religiosity* and *physical attractiveness* (Campbell et al., 1976, p. 374).

The general picture that emerges is that happiness is essentially unpredictable from knowledge of a person's position over a wide range of socially valued life circumstances, with the exceptions of being married and being employed. Apparently the real causes of happiness lie more in psychological factors, such as evaluations and expectations, than in environmental situations and personal advantages; such psychological factors are receiving some confirmation in

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2. An analysis of Campbell's life cycle data (1976, Figure 1) indicates that all married categories are statistically above average in well-being while all unpartnered categories (single under and over 30, widowed, divorced/separated) are statistically below average. (Single women over age 29 appear to be an exception).

Therefore, life cycle effectively reduces to a married/not variable, which was also found to be a reasonably significant predictor of well-being (r = .31) in the New Zealand sample. Because being married has been found to be advantageous in avoiding a wide range of psychological problems and difficulties, including suicide and mental hospitalisation (e.g. Cobb, 1976; Lynch, 1977), it can tentatively be treated as a "real" factor contributing to well-being. Of course, it is possible that the true cause-and-effect may be reversed (poor adjustment reducing marriage chances) or the relationship may reflect reciprocal causation.

The adverse effect of being unemployed is seriously under-estimated by the working/other factor in which unemployment is statistically swamped by other non-working categories: housewife, student, and retired. Examination of the original data (Campbell et al., 1976, p. 53) shows that being unemployed is associated with an average level of well-being that is nearly a full standard deviation below all other categories, and is by far the largest single factor affecting well-being in the entire survey analysis. Therefore, unemployment as such may, like life cycle, be viewed as a "real" and significant cause of unhappiness.

ongoing researches at the University of Otago.

Many people, including some social scientists, find these results surprising if not downright unbelievable. This suggests a strong prior belief that objective life circumstances must influence levels of well-being. The purpose of Experiment I was to find out just how strongly the various objective factors are believed by typical adults to operate as predictors (and implicitly as causes) of happiness.

Since most people do not think in terms of correlational statistics it was necessary to devise a judgment task that would reflect an intuitive notion of correlational strength. This task was the estimation of the percent of people who will be found to be happy in each category, or at each level, of a supposed life-circumstance factor. To the degree that its different categories produce different happiness percentages, a factor is perceived as a correlate of happiness.

After demonstrating the prevalence of these beliefs in Experiment I, Experiment II will consider how they might be maintained in the face of contrary evidence.

Experiment I

The purpose of this study[3] was to determine which of 15 possible situational factors were perceived by the public to be causes of happiness, and to select four such factors for the subsequent experiment on the cognitive processing. The subjects were 119 volunteer Dunedin adults over the age of 17 who responded to a sign posted over the experimenters' booth in a shopping mall next to a supermarket. Males contributed 40% of the sample.

The subjects' first task on the questionnaire was to state what percent of people are happy in each of the life categories provided for each factor. For example, *family income* was presented as three categories: less than $10,000 per year, $15-30,000, and more than $100,000. For each of these categories the subject circled one out of eleven numbers going from 00 to 100 in steps of 10 as the percent of people in that situation who are happy. A detailed example was provided to make this task clear.

The second task was to rate the importance of each factor for happiness on a 10-step scale from 1 for no importance to 10 for very important. To clarify how the factor was thought to contribute to happiness, subjects were also asked to circle one of two simplified category names as being the most advantageous for happiness. For example, next to *family income* subjects circled either "a high family income" or "a low family income".

The first task gave average judgments of the percent of people who are happy in each category of each factor. The strength of a factor's imagined correlation with happiness can be indexed by the largest difference in judged happiness rates appearing among its categories. The factors producing substantial differences (and their best and worst category rates of judged happiness) were: *number of friends* (68, 21%), *health* (75, 36), *emplayed/not* (65, 36), *city size* (68, 43), *disabled/not* (66, 43), *family income* (62, 40), *life cycle* (60, 39), *intelligence* (65, 47) and *type of work* (64, 48).

The direction of these results was largely as might be expected, favouring some or many friends, good health, being employed, rural versus large city living, no mental or physical disability, the two higher income brackets (equally), and professional or skilled work versus unskilled work. In the life cycle factor, all married categories were judged to be happier than single, divorced and widowed categories. Average intelligence was judged slightly more advantageous than very high, and much more advantageous than very low intelligence.

The unsuccessful factors producing extreme category differences of 7% or less were *education, physical attractiveness, age, sex (M/F), ethnic group (Maori/European),* and *religiosity (very/not-at-all religious).* These non-differences are consistent with objective data.

Of the factors perceived as causes of happiness, several could not be used in the next experiment (II). For example, it would not be credible to present subjects with a number of "random" cases to study in which

3. Experiment I was carried out and analysed with the help of Betty McKie and Kim Neville whose contribution is gratefully acknowledged.

half the cases involved a physical or mental disability, or in which half were separated, divorced, or widowed (life cycle), or in which half were out of a job (employed/not). Intelligence was eliminated due to its perceived non-monotonic relationship to happiness.

For the most part, the results of the importance ratings and directional choices on the second task merely confirmed the results of the first task. *City size* and *type of work*, however, revealed dissenting minorities who chose an alternative category to the most popular choice and gave it a mean importance rating above the midpoint value of 5.0. The minority choice for *city size* was "living in the city" versus "living in the country"; for type of work it was "manual work" versus "white collar work". (A nearly 50-50 split on the advantage of being a male or a female, with appreciable importance ratings in each case, raises the possibility that people tend to attribute advantages to their own circumstances.)

Eliminating these last two factors left only three usable factors producing consistent results in both judgment tasks: *friends, health,* and *income*. As a fourth factor was needed, the results were scanned again for a possible candidate. Although four levels of *education* had produced only a 7% category difference in the first task, between completion of 4/5th Form and a University degree, it appeared to have modest strength in the second task. Having "a high education" was nominated as advantageous by 86% of the sample who gave it a mean importance rating of 6.4, while only 14% chose having "a low education" with a mean rating of 4.6. Although the combined results for *education* were therefore weak, there was no better alternative, so it was selected as the fourth factor.

Experiment II

The results of the preceding study comply with Chapman's (1967) definition of illusory correlation as the case in which observers report a correlation between two variables which are in reality not correlated, or are not correlated as strongly as reported, or are correlated in the opposite direction. It was our colleague Peter Bradshaw who first suggested that we could clarify this field-study result using the experimental paradigm for illusory correlations. Experimental studies of this effect specifically demonstrate that an expectation that two variables are correlated leads people to misread a set of raw data which contradict that belief.

In the typical experiment, the subjects are asked to study a set of cases in each of which an observation on the first variable is paired with an observation on the second variable. These cases therefore make up the raw data from which a coefficient of association can be computed. In the standard paradigm, the cases are designed to produce an actual correlation of zero, but subjects expecting to find a positive correlation end up overestimating the relative frequency of pro-correlational cases. A brief synopsis of past findings will set the stage for Experiment II.

Experimental Studies of Illusory Correlation

The illusory correlation paradigm has been most commonly applied to the clinical situation in which the responses given to a projective test by disturbed people are believed to reflect their emotional problems. For example, it is commonly believed that people with an abnormal suspicion of others will draw unusual eyes in the draw-a-person test (Chapman & Chapman, 1967); homosexuals will give anal responses to Rorschach cards (Chapman & Champan, 1969); people classified as paranoid on the MMPI will be impatient, uncooperative and irritable (Dowling & Graham, 1976), and so on for a large number of popular diagnosis-symptom associations that have been demonstrated to be false. When subjects are presented with a series of instances that refute these popular expectations, they regularly misperceive the data as confirming a positive connection.

This effect is highly robust and resistant to correction. In their pioneering study, Chapman and Chapman (1967) found that the illusion persisted in spite of repeated viewings of the data over three days, in spite of giving the subjects unlimited study time, in spite of offering them a prize for accuracy, and in spite of allowing them to shuffle the instances around on the table. When they made the actual correlations in the data strongly negative, the effect was much reduced, but remained positive.

The effect has also been impervious to warning subjects that half of them would get data with no association, to providing explicit negations instead of equal alternative associations (Mowrey, Doherty & Keeley, 1979) to giving the subjects some sort of inoculation training (Kurtz & Garfield, 1978, Waller & Keeley, 1978) and to forcing subjects to guess the value of the second variable from the first on each instance prior to receiving corrective feedback (Golding and Rorer, 1972). Two studies using the clinical projective test materials have found that graduate students of clinical psychology produced illusory correlations as strong as or even stronger than undergraduate students (Dowling & Graham, 1976; Starr & Katkin, 1969). The size of the illusion does, however, increase with the complexity of the task or its information processing load (Chapman & Chapman, 1967; Dowling & Graham, 1976; Lueger & Petzel, 1979), although subjects will rarely encounter data in everyday life that are as direct and systematic as the experimental materials.

There is considerably less information available on the detection of true correlations, either positive or negative, in the same experimental tasks. Chapman and Chapman (1969) found that a true positive correlation was overlooked while illusory correlation was operating in the same data. Hamilton and Rose (1980) found, however, that some subjects could at least significantly detect such true and unexpected correlations.

It is worth noting that the demonstration of illusory correlation in a laboratory task does not require a zero correlation in everyday events, but if subjects see a correlation in laboratory data where none exists, it is reasonable to assume that they exaggerate whatever correlation occurs in real-world data.

The following experiment asks whether or not a representative group of adults will show the data-based illusory correlation effect with the four Popular factors of *health, number of friends, family income,* and *education* as predictors of happiness. As a side issue, the study also asks if these subjects can detect a true positive and true negative correlation between happiness and two other Neutral variables that were judged not to be popular predictors of happiness. The two concepts chosen for the Neutral role were amount of dreaming and GSR which was described vaguely as "a change in the electrical resistance of the skin which indicates emotional change".

Several hypotheses regarding the cognitive machinery of illusory correlation were studied by means of a recognition test. This analysis is given in the Appendix.

Method

Design

The experiment was divided into two conditions or parallel studies. We may think of Condition I as the "main study" investigating the strength of illusory correlation between each Popular and happiness, and only incidentally the ability of the subjects to detect true and perfect correlations built into the data between Neutrals and happiness. Condition II is a "check study" which investigates only two of the Populars, again set at a zero correlation with happiness, but considers the important control case in which the Neutrals are also set at zero correlation with happiness.

In both conditions, all subjects studied 16 fictional cases of 8 married men who are happy and 8 who are unhappy. In both conditions, each subject studied information on two Popular and two Neutral factors. For each such factor there were four "high" instances and four "low" instances (and eight other cases where the factor was not mentioned). When a factor was set for a zero correlation (O-r) with happiness, two of the "highs" and two of the "lows" were listed among happy men, and two of each among the unhappy men. This arrangement always applied for the popular factors, and applied as well for the Neutral factors in Condition II.

When a Neutral factor was set for a perfect positive correlation (+r) with happiness in Condition I; its four "high" instances occurred among happy men, and its four "low" instances among unhappy men. When it was set for a perfect negative correlation

(−r), the pairing was reversed. These perfect correlations occurred only for Neutral factors in Condition I.

Condition I was more elaborate than Condition II in having four list subconditions for studying all the Popular factors. Each subject saw only one list. The Populars were assigned in pairs as follows: for List A, health and friends; for List B, income and education; for List C, education and health; and for List D, friends and income. For two of these lists (A, C), dreaming was positively correlated, and GSR was negatively correlated with happiness, while for the other two lists (B, D) their roles were reversed.

Condition II used only two of the Populars, health and education as in List C above, except that dreaming and GSR were also set at a zero correlation with happiness in this condition.

Within each condition and list, the 16 cases were presented in four different fixed sequences to counterbalance for any order effects.

Subjects

The subjects were 60 Dunedin adults recruited from several sources, mainly from a parent-teachers association, a residence for nurses, firemen on duty at a station, and the Psychology Department's standing subject panel. The male:female ratio was 31:29. Ages, education levels, and occupations were varied and appeared to reflect a good cross-section of the public. Forty (40) subjects were randomly assigned to Condition I (10 to each list condition), and 20 to Condition II.

Procedure

Subjects were tested in small groups ranging from two to ten people, with different conditions and lists assigned by a random draw of the packets of materials. Subjects were instructed that the purpose of the experiment was to see what patterns people see in a set of psychological data, with the explanation that the data would be presented in different ways to different subjects. They were told that 16 cases of married men had been drawn from a previous psychological study on factors associated with happiness, and that 8 of the cases were unusually happy men, and 8 of them were unusually unhappy men. They were taken through a detailed example to ensure that they knew how to scan and interpret the factor information as they came to each case.

Subjects were then paced through the 16 cases in their individual packets by the experimenter who said "Turn" every 20 seconds as a signal to proceed to the next case. Upon completion of the study phase, the subjects filled out the three questionnaires for the dependent measures at their own pace. The debriefing explained that these fictional cases were in fact very much like real cases in respect to the Popular factors, while dreams and GSR had no known connection with happiness.

Stimulus Materials

Each case was presented in a skeleton outline form on a separate sheet of paper. Above the dividing line was given the man's initials, a random age between 28 and 62, and a low (1, 2, 3) or high (7, 8, 9) happiness score accompanied by "UNHAPPY" or "HAPPY". Below the line were listed two short phrases representing the results on two of the factors which could both be Populars (P + P), both Neutrals (N + N), or one of each (P + N).

These phrases were designed to convey the result clearly, but with enough variety on the Popular factors to make them plausible and a little bit interesting. For example good health could be: "Says he is in the 'pink' of health", while poor health could be: "Keeps a weekly appointment with his doctor." For the friends factor, one man: "Spends evenings with many friends", while another "Does not entertain his friend at home." Income levels were set either in a range of $5,000 - 8,000 per years or $25,000-30,000; "low" education levels varied from 4th to 6th Form, while "high" levels involved some University education, usually with a degree.

The phrases used for Neutral factors were more stereotyped. Dreaming occurred either never, rarely or seldom, or else usually, frequently or always. GSR scores were either 1, 2 or 3, or else 7, 8 or 9.

Table 1
(Condition I) Task 1 and Task 2 Results[a]

Factor	Lists	Task 1 *No. Ss Choosing* −r	O-r	+r	*p*	Task 2 *Estimated %* *M*	*SD*	*p*
		Popular Factors — Uncorrelated						
Health	A, C	1	11	8	.05	69.1	17.3	.001
Friends	A, D	1	8	11	.01	65.2	15.6	.001
Income	B, D	1	9	10	.01	56.7	13.1	.05
Education	B, C	1	12	7	.05	48.0	15.4	NS
Mean Percent		5.0	50.0	45.0				
		Neutral Factors — Positively Correlated						
Dreams	A, C	1	3	16	.001	76.5	18.5	.001
GSR	B, D	2	10	8	.05	61.2	21.7	.05
Mean Percent		7.5	32.5	60.0				
		Neutral Factors — Negatively Correlated						
Dreams	B, D	13	5	2	.001	42.0	22.5	NS
GSR	A, C	13	7	0	.001	41.7	28.6	NS
Mean Percent		65.0	30.0	5.0				

[a]The first row of data is read as follows: in Task 1, a single subject said that the happy men tended to be unhealthy (−r), 11 subjects said that happiness and health were unrelated (O-r), and eight subjects said that the happy men tended to have good health (+r); in Task 2 these same 20 subjects estimated, on average, that 69.1% of the happy men had good health, but their individual estimates varied, with *SD* = 17.3. (n = 20 in every row).

Dependent Measures

The first questionnaire (Task 1) asked the subjects what factors, if any, they noticed to occur more often with the happy men, what factors with the unhappy men, and what factors were unrelated.

The second questionnaire (Task 2) estimated the strength of the factors by asking the subject to state what percent of happy men are observed to have, for example, many friends and what percent of unhappy men do so, to total 100%. (This method defines the base rate for having many friends as 50%).

The third questionnaire (Task 3) was an unpaced recognition test as described in the Appendix.

Results

Popular Factors. The results for the first two tasks are shown for Conditions I and II in Tables 1 and 2, respectively. The lefthand sections (Task 1) show the number of subjects who elected each type of correlation (−r, O-r, +r) for each factor. Significance of the positive illusory correlation effect was tested by assigning scores of −1, O and +1 to the corresponding correlation choices, permitting *t* tests on the null hypothesis that the mean of these scores is 0.00.

Task 2 results are given in the righthand sections of the tables. Here is shown the mean percent of the time that each factor (in a positive sense) was judged to occur among the happy men. (The mean percent of the time that the factor occurs among the unhappy men was, by definition, as far below 50% as the happy men's mean was above it.) The null hypothesis in this case was a true mean of 50%, with *t* tests producing the significance levels shown.

There is a clear and consistent illusory correlation effect for *health, friends,* and *income.* Combining the Task 1 results for Condition I and II, nearly half (47.4%) of the subjects nominated these three factors as characteristic of happy men. Only 7.5% nominated them as contributors to unhappiness. In Task 2, these factors (in their positive form) were estimated to occur 69.1,

Table 2
(Condition II) Task 1 and Task 2 Results[a]

Factor	Task 1 No. Ss Choosing −r	O-r	+r	p	Task 2 Estimated % M	SD	p
	Popular Factors — Uncorrelated						
Health	3	8	9	.06	65.7	21.8	.01
Education	8	6	6	NS	38.6	18.2	.01
Mean Percent	27.5	35.0	37.5				
	Neutral Factors — Uncorrelated						
Dreams	5	13	2	NS	60.8	18.3	.05
GSR	3	16	1	NS	46.5	19.7	NS
Mean Percent	20.0	72.5	7.5				

[a]The n for each row in the Table is 20. See footnote to Table 1 for interpretation of the data.

65.2, 56.7 and, in Condition II, 65.7% of the time among happy men. The grand mean is 64.2. If Task 2 estimates are recorded only in those cases where subjects nominated a factor as a positive correlate of happiness (+r) in Task 1, this Task 2 grand mean rises to 69.0%.

There was no consistent evidence of illusory correlation for the *education* factor, but this is not surprising given its weakness in Experiment I.

Neutral Factors. As a control on the illusory correlation effect, it is necessary to demonstrate that, when no correlation is expected (dreams, GSR), and no correlation is presented (Condition II), no correlation is reported. This is generally confirmed in Table 2. Subjects do not automatically report positive correlations in this situation.

Furthermore, subjects were sensitive to true correlations among the Neutral factors when they did occur (Table 1). When the true correlation was positive, 60% of the subjects detected it, when negative, 65% and when it was zero (Condition II, Table 2), 72.5% reported it correctly.

The analysis of recognition data (Appendix) found no evidence that subjects more effectively learned those cases that supported their expected correlations for Popular factors, than cases which did not.

Discussion

There is clearly a wide discrepancy between most people's beliefs about the role of objective circumstances as "causes" of happiness (Experiment I) and their true relationship to it (Introduction). The real data clearly imply that the pursuit of health, many friends, greater intelligence, a higher income, a home in the country, and a white collar job are not rationally in pursuit of happiness itself.

It must immediately be asked how such cultural expectations could have arisen in contradiction to real life data. Experiment II demonstrates one contributing factor—even under the motivating conditions of a laboratory task, people do not correctly read clear-cut evidence for a zero correlation when it is contrary to their beliefs.

This still does not explain how the false beliefs have arisen in the first place. At a practical level, we should certainly take account of the images conveyed through the media from politicians, economists, institutional spokesmen, story-writers and especially advertisers. But assuming that most of these advocates are sincere believers, the origin of the fallacy is still unidentified.

It is useful to keep in mind that pure superstitions with no basis in reality are not uncommon; many people strongly believe in ESP, horoscopes, biorhythms and the effect of moon phases on birth rates in maternity wards, among many other fallacious correlations. (See *The Skeptical Inquirer* and *The Zetetic Scholar* for skeptical reviews and disconfirming evidence; see also Marks and Kammann, 1980 on ESP).

The "magical thinking" concept advanced by Shweder (1977) assumes that people ascribe a causative connection between two variables that are merely related by similarity. Similarity (or mediated association) could account for the projective test illusion; for example, suspicious or paranoid people draw *unusual eyes* because, when people are momentarily suspicious, they often *squint their eyes*, and so on. Applied to the present problem, we might assume that happiness, health, wealth, popularity, pastorality, intelligence, and professional work have all been culturally over-learned as "good things in life". This amounts to a halo effect (Cooper, 1981) and predicts that the listed circumstances will be perceived as more highly intercorrelated than they really are.

Another possibility is that people overgeneralise from vivid short-term experiences to pallid long-term states. A gathering of friends, a windfall of money, a flash of intelligence, or a week in the country may produce a short period of pleasure; illness or social rejection may produce acute distress. But through adaptation (Brickman, et al., 1978) or opponent processes (Solomon, 1980) these situations gradually lose their emotional impact, while the fading out of affective responses goes unnoticed.

In either case, it makes sense to assume that happiness delusions would not arise if the true causes were easy to observe. Current thinking suggests that the true causes (ignoring circular feedback loops) may reside in mental criteria, expectations, justice-demands, perceptual biases and the like. Such psychological states are clearly not as observable in other people as are their illnesses, friendships, material possessions, and so on.

Furthermore, there is good evidence that people generally do not perceive happiness itself accurately in other people and tend to use perceived warmth and sociability as a yardstick (Note 2). Therefore, to perceive the true causes of happiness in others it is necessary to relate one set of invisible cognitions (the "causes") with another set of invisible feelings (happiness).

The confusion of inner states of well-being with outer signs of prosperity and success has a long history in western thought, including Aristotle's concept of eudaimonia. In some languages, for example German and Slavonic ones, the two types of meaning are conveyed by a single word, while some contemporary English dictionaries still list two definitions of happiness: (a) good luck, good fortune, prosperity; (b) a state of well-being and pleasurable satisfaction. And so we say, happiness IS . . . (something external).

Appendix

Analysis of Recognition Data

The recognition test (Task 3) following the study of the 16 cases of happy and unhappy men in Experiment II was designed to test the assumption that illusory correlation arises from the differential encoding into memory of some cases in preference to others. Three hypotheses were tested under this model, called the *expectancy* effect, the *congruence* effect, and the *positivity* effect.

To begin, each of the two variables involved in the study task, for example, health and happiness, may be reduced to a binary variable with only two values, high (+) and low (−). Where a positive correlation is expected, there are two kinds of confirming cases: both variables are high (++) and both variables are low (−−). The disconfirming cases have crossed signs (+−, −+). The *expectancy* hypothesis is that confirming instances (++, −−) are better recalled than disconfirming cases (+−, −+). Where a negative correlation is expected, the prediction is reversed. The prediction only applies where a correlation is expected.

The other two hypotheses concern cognitive biases that might contribute to the creation of positive illusory correlations. Such a mechanism is needed since an expectancy effect can only account for the maintenance of an incorrect belief once it exists, but cannot explain how the belief arises in the first place. Our starting point here was the general finding that people place undue reliance on positive confirming (++) cases when explaining their belief in non-existent correlations (Crocker, 1981; Smedslund, 1963; Ward and Jenkins, 1965).

The *congruence* effect supposes, like the expectancy effect, that ++ and −− cases are more easily understood and encoded than

Table 3
Mean Confidence that Recognition Items are "Old":
Comparisons for Three Hypotheses

Comparison Item Group (N)	N Items Pro:Con	Mean Confidence "Old" Pro	Con	t	p
Congruence + Expectancy					
P + P Condition I (40)	2:2	.80	.54	.98	NS
P + P Condition II (20)	2:2	.45	1.03	—1.81	NS
Congruence Only					
N + N Condition I (40)	2:2	.41	.41	.44	NS
N + N Condition II (20)	2:2	—.10	.10	—.36	NS
Positivity					
P + P Condition I (40)	1:1	.90	.78	.38	NS
P + P Condition II (20)	1:1	.75	.75	.15	NS
N + N Condition I (40)	1:1	—.20	—.22	.08	NS
N + N Condition II (20)	1:1	.02	—.07	.54	NS

+− and −+ cases. In the case of congruence, however, this is assumed to be a basic cognitive process occurring independently of expectancy. Therefore, it should appear in the zero-correlated Neutral factors (Condition II). If congruence is confirmed, then the expectancy effects requires a stronger memory bias in Populars (congruence + expectancy) than in Neutrals (congruence only).

The *positivity* effect assumes that any positive observation (+) is easier to process mentally than any negative (−) observation. This can only be tested where the cases have the same sign, and predicts that ++ cases will be better recognised than −− cases. This can be examined in both Neutrals and Populars.

Method

The recognition test in Experiment II consisted of 16 cases similar to the study cases. In each, the man was identified as happy or unhappy along with observations on two of the four factors being studies, for example, observations of good health and low income. The subject's task was to decide if this case had been presented in the study phase ("old") or was "new". This choice was supplemented by a confidence rating of 0, 1, or 2 for no confidence, some confidence but not a lot, and fairly confident. For scoring purposes the results were structured into a five-step scale ranging from −2 for fairly confident "new" to +2 for fairly confident "old". No-confidence ratings were counted as zero regardless of the new/old choice.

In order to test the three hypotheses, it was necessary to use cases where the signs of the factor values agreed so that, in respect to happiness, *both* factors defined the same type of case (++, −− +−, −+). If this were not so, the case would contain conflicting instances, and no prediction could be made.

The second restriction, necessary to distinguish between expectancy and congruence effects, was that the recognition test cases had to consist of both Popular factors (P + P) or both Neutral factors (N + N).

The third restriction was that all cases contributing to the recognition analysis had to be actually old or actually new cases. In fact, the usable cases were all new, but only in the trivial sense that the two observations presented together in the recognition item were drawn verbatim from two *different* cases in the study phase. Other identifying characteristics of the study cases (the man's age and numerical happiness score) were omitted.

The test was designed so that eight cases met all three restrictions and were usable for testing the hypotheses. The other eight filler items were actually old cases involving both a Popular and a Neutral factor (P + N) which usually contained unlike signs. A firsthand perusal of the whole set of 16 cases gives reassurance that subjects were most unlikely to detect the underlying structure of the recognition test. Furthermore, since all hypotheses required comparisons only among the actually new, like signed, P + P/N + N cases, any pattern recognition would be irrelevant to the results.

In the analysis we designed it was not possible to separate discriminability (d') from the response criterion setting since the actually old cases were not comparable to the actually new cases. If the hypotheses had been supported this task would remain to be done, but as they were not, that analysis becomes superfluous.

Results

It can be seen in Table 3 that there was no significant, or even near-significant evidence by matched *t* tests that subjects called confirming, congruent, or double positive (all 'pro') cases "old" more confidently than they called their opposites "old". It was then considered that the predictions might be more successful among those subjects who had nominated one or both factors as positively associated with happiness in Task 1 (see Experiment II). A separate analysis failed to support this notion.

The congruence hypothesis makes one additional prediction that does not depend on recognition data, that is, that true positive correlations will be more easily detected than true negative correlations. A comparison of the two classes of Neutral factors in the bottom half of Table 1 (main text) does not support this. The positive correlation was detected 60% of the time, the negative correlation 65%. Thus, the congruence hypothesis (and the positivity hypothesis) fails to explain the original development of the false correlational belief.

The one significant result in the recognition data was that all types of P + P items were judged "old" more confidently than all types of N + N items. Since this applies to disconfirming as well as to confirming cases, it does not seem to illuminate the illusory correlation effect. It may simply reflect the greater verbal meaningfulness of the Popular cases.

Discussion

In a laboratory situation where illusory correlation is operating, there is no evidence in the recognition test that disconfirming cases are less thoroughly processed into memory than confirming cases. This leaves open the possibility that such cases could be found less well retrieved in a recall task. This needs to be tested. However, an extension of Chapman's (1967) associative strength model can account for most laboratory illusory correlation results without requiring the subject to forget or discount disconfirming cases.

Suppose that a subject, faced with a covariation judgment, has, in effect, a pro-correlation register (+R) for confirming cases (++, −−) and an anti-correlation register (−R) for disconfirming cases (+−, −+). Assume further that these registers are simply associative memory traces reflecting the past frequency of the relevant cases of each type. (The frequency principle could be supplemented by a similarity principle, or a vividness principle, to explain how an incorrect correlational belief arises in the first place—see Discussion in main text.)

When asked to state how one variable covaries with another, the subject compares the two registers. When the trace strength in $+R > -R$, the correlation is judged positive (and how much so), when $+R < -R$ it is judged negative (and how much so), and when $+R \approx -R$ it is judged as zero (no relationship).

In the typical laboratory case where two variables are chosen to reflect a prior belief in a positive correlation, $+R > -R$ to begin with. The subject then encounters a run of zero-correlation cases which increment both registers equally or, more probably, with diminishing returns on trace strength. When asked about the relationship observed in these new data, the subject again compares the two registers and, failing to distinguish between the trace strength based on the new cases and the initial strength based on prior experience, still finds $+R > -R$. The subject concludes, therefore, that more confirming cases must have been presented.

Simple as it is, this model accounts the standard laboratory illusory correlation effect based on prior belief. It further accounts for the correct detection of true positive and true negative correlations, and the "training effect" observed by Golding and Rorer (1972) in which the magnitude of the illusory correlation was lower after the study of laboratory data than it was before.

Reference Notes

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[2] Kammann, R., Smith, R., & McQueen, M. Low accuracy in judgments of others' happiness (among other things). Manuscript submitted for publication, 1982.

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